Maintenance Work Management Improvement

Improving Culture and Work Process

TR-109734

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EPRI Project Manager
R. Pflasterer

EPRI 3412 Hillview Avenue, Palo Alto, CA 94304, PO Box 10412, Palo Alto, CA 94303, U.S.A. 800.313.3774 or 650.855.2000, www.epri.com

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ORGANIZATION(S) THAT PREPARED THIS REPORT

Reliability Management Group
Entor Corporation

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CITATIONS

This report was prepared by

Reliability Management Group
151 West Burnsville Parkway
Minneapolis, Minnesota 55337

Principal Investigator
J. Thorne

Entor Corporation
861 Prospect Heights
Santa Cruz, California 95065-1413

Editor
M. DeCoster

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REPORT SUMMARY

EPRI's Plant Maintenance Optimization (PMO) mission is to develop and demonstrate products and services for improved use of power plant maintenance resources and increased profitability. Based on a series of work management improvement projects, EPRI plans to develop a best practices guideline. As part of this effort, this document details how to improve fossil power plant work culture and work processes.

Background

The cost leverage of favorable fuel contracts alone is not enough of an advantage to keep fossil power stations competitive in an open market. Enhancement of non-capital resources, such as work culture and work processes, also is needed to help plants maintain their advantage as low-cost energy producers. EPRI's experience has shown that work management improvement projects enhance work processes and work culture in fossil power plants. This project is part of EPRI's PMO efforts, specifically Target 43: Steam Turbine, Generator and BOP in 1997 and Target 54: Plant Maintenance Optimization in 1998.

Objectives

- To improve human and mechanical system reliability throughout fossil power stations.
- To define and reinforce station values, vision, mission, and direction.
- To develop a system of accountability.

Approach

Improvement projects are collaborations between internal station staff and an EPRI/Reliability Management Group (RMG) team, usually lasting six weeks. The project team first assesses current practices using EPRI's *Value-Based Maintenance Grid*. Based on the results of this assessment, an improvement project is begun. (Data from six previous assessments are available in TR-106430). The first phase of this project focuses on work culture, establishing a foundation for change. This phase includes development of Vision, Mission, and Values statements. An Out-of-Sync conditions list also is drawn up along with selection of action teams to address those conditions. To ensure accountability, individual and department roles, responsibilities, and relationships are defined. In the second phase of the project—improving maintenance

work processes—an action team of station members develops a written set of procedures to govern station work practices. This Work Practices manual gives each department and individual a clear understanding of their roles and responsibilities.

Results

In previous improvement efforts, stations typically score an average 2.3 out of a possible 5.0 on EPRI's Value-Based Maintenance Grid. By completion of an improvement project, overall Grid scores typically increase to 3.6 for a 55% improvement. Effective leadership teams also are in place at the head of every major station function, each with a full set of tools and performance standards to draw upon.

EPRI Perspective

Improvement projects make changes for the better. Typically, non-fuel O&M costs have dropped by more than 11% and availability from a five-year average in the low 80th percentile has climbed to the upper 90th. Forced outages also have decreased, with a five-year Equivalent Forced Outage Ratio (EFOR) average falling from 7.5% to a current year-to-date average of just over 4%. The end of an improvement project, however, does not mean the improvement process is over. With effective improvement structures in place, fossil power stations are prepared for continuous improvement.

TR-109734

Interest Categories

Fossil steam plant performance optimization
Fossil steam plant O&M cost reduction
State-of-the-art power plants
Fossil assets management

Keywords

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Work process

ABSTRACT

These activities are part of EPRI's Plant Maintenance Optimization (PMO) development efforts. They are in Target 43: Turbine, Generator and BOP O&M Cost Reduction in 1997; and Target 54: Plant Maintenance Optimization in 1998. The PMO mission is to lead the industry by developing and demonstrating products and services for improved utilization of power plant maintenance resources and increased profitability for generation business units/companies. An EPRI guideline on maintenance work management best practices will be developed based on a series of work management improvement projects.

Work management improvement projects implement changes in work process and work culture in fossil power plants. An overall improvement effort has three steps. The first step is to assess current practices using EPRI's *Value-Based Maintenance Grid.* The second step is an improvement project. The third step is reinforcement of those improvements over time.

An improvement project consists of two distinct phases. One phase focuses on work culture and the other phase focuses on maintenance work processes. Typically, the work culture is improved first, establishing a *foundation for change*. This includes preparation of *Mission/Vision/*Value statements, an *Out-Of-Sync* condition list, establishing *Action Teams* to address those conditions, and defining *Roles/Responsibilities/Relationships* to establish accountability and measurability. The second phase, improving maintenance work processes, results in a *Work Practices Book*. Improvement projects are joint effors between internal plant staff and the EPRI/RMG team. A major commitment of time and energy must be made by the plant management staff.

Improvement projects have been attempted by internal staff at utilities, and have failed. Success has been achieved in EPRI/RMG projects because the external facilitation team has the following attributes: *experience and expertise* in the improvement process, *independence* from the internal organization and interruptions, *commitment* to the process full time, and *knowledge* of what works in other industries and at other stations.

At the request of the sponsoring utilities, utility names and plant names are omitted from this report.

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INTRODUCTION

Primarily motivated by the coming competitive market environment, fossil power stations are seeking ways to strengthen and maintain their advantage as low-cost power producers. The cost leverage afforded by favorable fuel contracts is not enough of an advantage by itself. Further enhancement of other non-capital resources, such as culture and work process, are also needed.

To this end, the first step a station takes is to conduct an assessment of its maintenance practices. The results of that assessment are reported in a Assessment and Action Plan document presented to the station. Data from many assessments has been combined in an EPRI report: *Maintenance Work Management Practices* Assessment (EPRI TR-106430). The issues and insights raised from an assessment lead to a joint (utility & RMG) Work Management Improvement Project.

The basis for an overall improvement process rests on the principles of *Continuous Improvement* and is focused on building the reliability of both human and mechanical systems throughout the station. A Work Management Improvement Project is a directed facilitation by RMG to establish new paradigms and practices in both human interaction and work processes.

An improvement project begins with the formation of a Foundation Team, a cross-functional, cross-level group representing all facets of the plant work community. Their function is to develop a Vision, a Mission and a set of Value statements for the station. The Vision is a picture of what better looks like. The Mission Statement states the purpose for the enterprise and the context in which it will achieve its purpose (i.e. - low cost producer with regard for environmental stewardship). Values express what members of the work community value. That is, what principles and modes of interaction they aspire to. Examples include open and honest communication, trust and respect, fairness, directness and timeliness. The Vision, Mission and Values represent the Foundation upon which all aspects of improvement must rest. Without a Foundation of mutual trust, respect and commitment no other meaningful improvement is possible. With such a Foundation, almost anything is possible.

Next, conditions are identified at the station which are Out-Of-Sync with the set of common Values. These are the conditions, which if uncorrected, retard full Mission success and forestall the organization's ability to bring its Vision to life. Using a

prioritized list of such conditions, Action Plan Teams utilize basic problem solving methodology to develop recommended corrective measures, authorized for implementation by the Foundation Team. This is an ongoing process with four or five Action Plan Teams working concurrently on different issues at any point in time.

In order to make the transition from building a Work Culture Foundation, to building a Work Practices Foundation, it is necessary to identify and rationalize the Roles, Responsibilities and Relationships (R, R & R's) for all exempt employees. This process of spelling out job functions and customer/supplier relationships clarifies gaps and overlaps in accountabilities which creep into an organization's structure over time.

Accompanying the R, R & R's is the development of a system of Performance Management which measures how well or poorly each exempt employee is achieving required job functions. The measurement process developed for the station provides an overall rating and a specific set of *Above, At or Below Expectations* for each function. The *Below Expectations* outcomes, taken together, form the basis for an individual's development and improvement plan.

During the process of clarifying individual R, R & R's, the Work Practices Steering Committee (WPSC) is formed. Composed of the Supervisor/Department Head level employees, the WPSC's job has been to identify and spell out the practices and procedures for all facets of the maintenance and operations work cycle, from Work Identification and Approval to Backlog Management, to Work Planning, to Long Range and Daily Scheduling, to Maintenance Histories. This body of work is contained in the Work Practices Guidelines manual and literally covers every aspect of the Maintenance/Operations interface and all supporting functions. The development of Work Practices is the most crucial part of the Process Improvement part of the project, generating current and lasting impacts to the bottom line. Like other development initiatives, this one utilizes a participative approach involving those most affected by or involved in the process, procedure, practice or change being developed. This approach becomes known as the *Process*.

The Foundation Team, Action Plan Teams and Work Practices Steering Committee all continue to identify needs for change, use the *Process* to develop the needed recommendations and lead the change implementation process for both Work Culture and Work Practices issues. This is the essence of Continuous Improvement.

Work Management Improvement is the most significant step. However, at the end of an improvement there are still a multitude of old habits, distrusts and baggage from the past, and there are new ones being created every day. The next step is called Reinforcement. Periodic progress reviews help people maintain momentum, prevent backsliding, and continue to implement corrective actions. There is a tendency to believe what you hear over what you see and to confuse motion with progress. That is why there is a section of this report devoted to *Opportunities Remaining*.

Cautions aside, although there is much to be done and always will be, a station makes tremendous strides in an improvement effort. In the author's experience, the size and rate of the improvement grows with time. To paraphrase Ben Franklin, "A project well begun always draws to it all it needs to achieve its aim."

Primary Improvement Opportunities From An Assessment

An RMG/EPRI assessment is conducted over a 6 week period of on-site work. It evaluates a station on the RMG/EPRI Value-Based Maintenance Grid. Along with about 500 categorized criteria analysis of the Grid, the station is benchmarked and employees are surveyed. The results of this assessment are an overview of the situation, the challenges and the opportunities facing people at the station. Although this amounts to a few hundred opportunities and recommendations, a typical focus of an improvement effort is to:

- Define specific roles, responsibilities and relationships
- Implement an organizational structure which promotes the successful accomplishments of the above
- Identify Key Performance Measures for individuals and the Station, set specific goals for each Key Performance Measure
- Identify and Implement short-cycle, actionable measurement of performance and results
- Develop a system of accountability
- Define and establish optimum Customer/Supplier relationships and support these with measurement of satisfaction levels
- Improve all forms of communication, with primary attention to observed and perceived barriers and filters in the organization
- Develop and use regular problem solving groups and formal approaches
- Clearly define and reinforce Station values, vision, mission and direction

Explanation Of The Value-Based Maintenance Grid

The Value-Based Maintenance Grid is a format for comparing maintenance practices to *Best Practices* within the industry. The activity/component is listed on the left that corresponds to each row. Each activity (cell) in the grid is rated as *Not Available*, *Available-Not Used*, *Available-Minimal Use* or *Fully Implemented*. These ratings are based

on a collaborative assessment by Reliability Management Group (RMG) and EPRI. RMG focused primarily on work culture and processes with EPRI focusing on technology utilization. Information from survey questionnaires, interviews, consultant field observations and general discussion with plant personnel was used to develop each activity rating.

Value-Based Maintenance Grid Before An Improvement

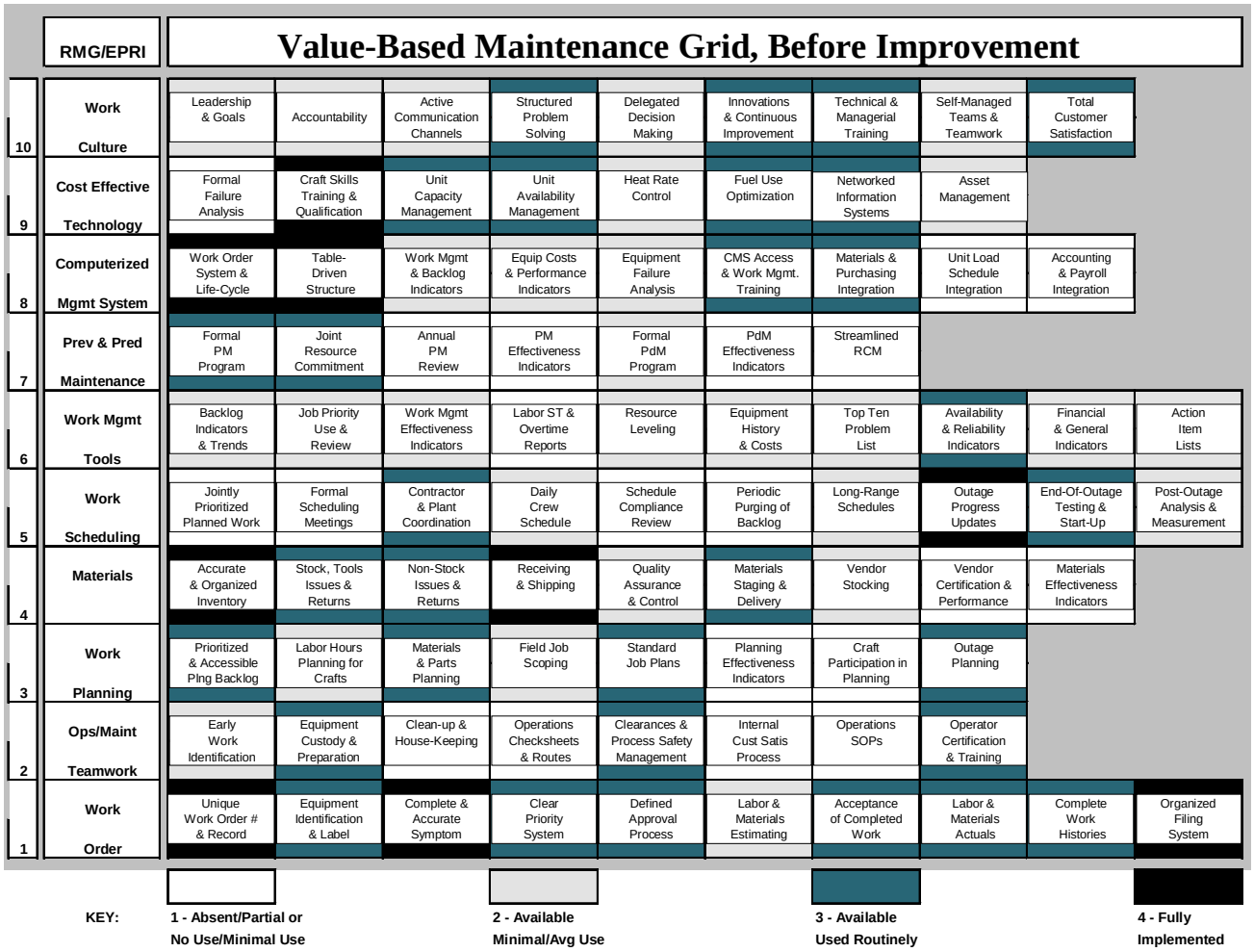

Figure 1-1
Value-Based Maintenance Grid Before The Improvement

2

STATION FOUNDATION (GENERAL)

The station foundation can best be described as a consensus of the purpose for the Station, a vision of what better looks like (relative to the current state) and a list of shared values that guide the actions for all employees. Coupled with this *constitution* and *bill of rights*, the Station must continually seek out conditions that exist at the Station which are out of-sync from what is desired. Once conditions are identified, they must be aggressively analyzed and resolved. The on-going activity of institutionalizing and preserving the station foundation is done through the cross-functional, cross-departmental governing body, known as the Station Foundation Team.

Foundation Building (Vision, Mission, Values)

The Approach

There are three elements instituted before beginning to form the station foundation. The first regards preparing the Plant Manager to lead the organization through the process. The second involves forming a cross-functional, cross-departmental team. And the third element involves preparing the participants for change.

Preparing the Plant Manager begins with general discussions regarding what constitutes a station foundation, what the benefits are and the different methods organizations use to establish one. It is typically determined that a station foundation will be developed and implemented using a team approach. The deliverables of this process are:

1. Develop the Plant Manager's understanding of and ability to lead station management through philosophical discussions to arrive at a documented understanding of what the common beliefs and directions (Vision, Mission, Values and Direction) are for the Station.

2. Document this understanding in a way that can be communicated to all employees.

3. Communicate the common beliefs and directions to all employees, in such a way, that it is implied that all future decisions will be made with these as there fundamental basis.

4. No decisions will be implemented that conflict with the common Vision, Mission or Values.

The design of the Station Foundation Team is accomplished through discussions regarding employee participation, different prevailing perspectives, buy-in, acceptance, and institutionalization. The result is typically a list of about 24 individuals who represented the diversity of the Station. This includes representatives from Plant Management, Hourly Personnel and the Union. It is deemed vital that a true cross-section of the organization has a voice.

Before the first meeting, each Foundation Team participant is asked to complete a 'Pre-Meeting Handout'. The purpose of this exercise is to begin shifting the typical train-of-thought from running the station, to a substantially more emotional train-of-thought regarding how people felt about the station and how they wanted to feel about the station. To some this exercise strikes a nerve, to others it is a welcomed change of thought. The desired goal is to get participants to an emotional level, to think about what could be, and to initiate the beginning of change.

With the ground-work laid, the RMG consultants design a meeting plan that will enable the Station Foundation Team to build their foundation. The first meeting educates the team as to what a foundation is; why a vision is important; who is responsible for developing the vision; and actually developing a Vision Statement. The second meeting gains consensus on the Vision Statement; educate the team on what a mission statement is; and developing a Mission Statement. The third meeting gains consensus on the Mission Statement; educate the team on what values are and why their important; and develop the station Values. Each meeting session uses a similar approach with the Plant Manager leading the meetings, RMG providing the education and facilitation, and the team members participation to develop the deliverables. Development is conducted through brain-storming sessions in typically four small sub-groups of six team members each, with each sub-group reporting to the full team to merge everyone's ideas.

After development of the Station's Vision, Mission and Values, RMG designs the next meetings to begin exposing the conditions that existed at the Station which are out-of-sync (relative to what is desired). These meetings are again lead by the Plant Manager and facilitated by RMG. Through working sessions, the team identifies many conditions which are Out-Of-Sync.

To communicate these initial results, the Foundation Team typically holds attendance voluntary meetings throughout the Station. The information is presented by team members from Management and Non-Management personnel. The results of this communication are favorably received, and a few additional Out-Of-Sync conditions are often identified.

From its formation, and on into the future, the role of the Station Foundation Team is to preserve the station foundation and continually, aggressively work to remove conditions which are Out-Of-Sync and preventing the full attainment of the Station's Vision of what better looks like.

Station Mission Statement

> The Mission of this station is to provide low cost reliable products and services, efficiently meeting the needs of customers, consistent with the station vision.

Station Vision Statement

> The Vision for this station is to provide a safe and clean work atmosphere which fosters the greatest degree of harmony through the recognition of good performance, and where all employees feel the greatest sense of pride and accomplishment. The station will be a work place where employees have a clear understanding of their responsibilities and limitations and consider quality when making decisions; where teamwork, trust and support, open and honest communication, and respect for one-another create a sense of gratification and job satisfaction for all employees.
>
> In all endeavors station employees will strive for honesty in actions, flexibility in approach to problem solving, and accountability for performance. They are committed to doing the right things, being responsive to the needs of the community, to work quality and to environmental stewardship. The employees will produce reliable electricity at the lowest possible cost.

Station Values Statement

- To be a workplace where teamwork, trust and support, and respect for one-another are common, the employees will:
  - — Perform jobs to the best of their ability.
  - — Respect other’s ideas and try new ones.
  - — Be willing to support each other through training and sharing information.
  - — Recognize productivity and creativity of others.
- To ensure open and honest communication, the employees will:
  - — Tear down barriers to open communications.

  - Always be honest in all our dealings.
  - Address all issues and provide timely feedback

- To promote honesty in our actions, the employees will:
  - Be honest in whatever action is being performed (work, facts, other).
  - Be honest with ourselves.
  - Do what we say.
  - Be fair, firm and friendly.

- To ensure commitment to environmental stewardship and provide a safe and clean work atmosphere, the employees will:
  - Work to encourage teamwork between different work groups, protect and lookout for each other in the work place, pickup after ourselves and others, do timely maintenance, continue to provide all safety items, and inform all employees of environmental requirements.

- To foster recognition of good performance and a sense of pride and accomplishment, the employees will:
  - Acknowledge and praise good performance.
  - Communicate expectations.
  - Be considerate of one another.
  - Seek and encourage employee input.
  - Foster independence and leadership.

- To create a sense of gratification and job satisfaction for all employees, the employees will:
  - Provide challenging opportunities.
  - Promote self directed work activities.
  - Develop and communicate measurable goals.
  - Support independent thinking.

  - Identify and remove barriers to success.

- To ensure accountability for performance and for work quality, the employees will:
  - Provide feedback.
  - Commit to doing the job correctly the first time.
  - Define lines of responsibility.
  - Provide adequate resources.
- In order for employees to have a clear understanding of their responsibilities and limitations, to ensure they consider quality when making decisions and to ensure that they know and do the right things, the employees will:
  - Communicate and discuss expected duties while realizing barriers hindering job completion.
  - Stress the importance of quality and provide tools to recognize and reward good performance.
  - Lead by example to demonstrate right.
- To promote flexibility in problem solving, the employees will:
  - Encourage, support and reward creativity among employees.
  - Solicit, listen and respond to employees' ideas.
  - Provide tools, training and technical support to develop new initiatives.

Out-Of-Sync Conditions & Action Plan Teams

The Approach

Each condition which is Out-Of-Sync with the Station Values needs to be addressed. To do so, groups called Action Plan Teams are created to address the top ranked conditions. Typically, teams address four conditions at a time, so not to spread resources too thin, and to gain some victories early on. These victories convince others of the value of the Action Plan Teams and of the Improvement Process overall.

The makeup of each team varies, but the first teams typically consist of people from the ranks of division heads and first line managers, and subsequent teams are made up of

Supervisors, Engineers and bargaining unit employees. They have a designated leader or co-leaders of station personnel and are facilitated by RMG.

The purpose of these teams is two-fold. First, they are to address the particular condition. This is the tactical purpose of the teams. Secondly, they are to teach the members the process of solving problems in a structured manner. The second purpose is strategic, to ensure station employees can continue in the future to solve problems without outside assistance and direction. Members of the first teams lead or facilitate following teams and share their experience in the process of problem solving.

RMG supplies a fourteen step process for the teams to follow. Steps 1 through 4 deal with creating the teams. Steps 5 through 12 deal with actually solving the condition through discussion and identification of situations or areas in which the condition manifested its self and then writing problem statements to clearly identify the issues. To achieve understanding of the root cause of the condition, teams used tools such as brainstorming, cause and affect charts, Cloud Bursting Techniques and multi-voting. The final steps, 13 through 15 deal with presenting the plans to the Station Foundation Committee for approval and implementation.

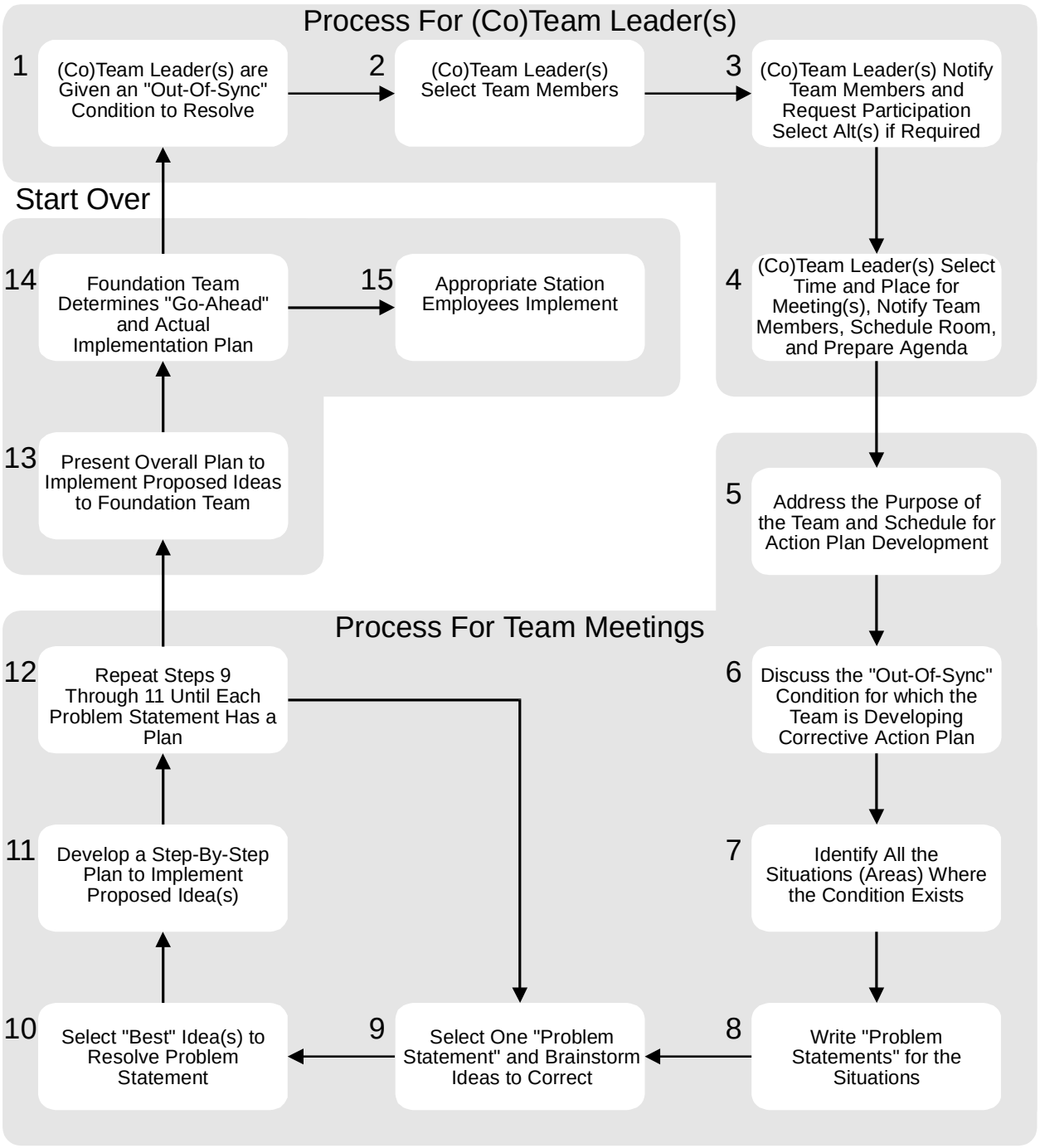

Figure 2-1
Action Plan Development Process

Leaders are coached in the effective use of meeting tools such as agendas and action registers to ensure the meetings progressed along an orderly track and that items are followed up on between meetings. Leaders are also coached between team meetings by

RMG on meeting skills and people handling issues. During the meetings, RMG facilitates discussions and uses problem solving tools.

As the Out-Of-Sync conditions are addressed, the next conditions on the priority list are tackled. As each condition is eliminated, there may be an elimination of connected conditions on the identified list.

The Results

Typically, by the end of an improvement project Action Plan Teams have been established to address many Out-Of-Sync Conditions like the following examples:

1. Leading By Example
2. Communication Channels
3. Recognition, Rewards and Consequences
4. Soliciting Employee's Ideas
5. Break Room Cleanliness
6. Working To Best Of Our Abilities
7. Stressing The Importance Of Quality

Examples of other identified Out-Of-Sync Conditions to be addressed after an improvement project are:

- Parking Policy
- Accessing Blame
- Compassion
- Snow Policy
- Compromise
- Proper Communication
- Working Environment
- Training

- Setting Measurable Goals
- Timely Feedback
- Open Communication
- Commitment to Help One Another (Day-To-Day)
- Company Policy - Do Not Follow
- Sense Of Entitlement
- Respect Each Other and Property
- Acceptance Of Decisions & Policies
- Attendance Policy
- New Initiatives
- Having Trust Between Each Other
- Establishment Of Clear Expectations
- Teamwork Between Different Groups.

Roles, Responsibilities & Relationships (R, R & R's)

The Approach

The re-establishment of the R, R & R's for each position may be the result of the Station's acknowledgment that currently existing R, R & R's are Out-Of-Sync. It may be that station personnel do not have a clear understanding of what their R, R & R's are supposed to be. RMG's plan to correct this issue has four basic elements. The first is to collect and analyze all existing documentation regarding position R, R & R's. The second is to identify all current positions (not by titles, but actual jobs) and develop detailed R, R & R's for what is currently being done or expected to be done. The third element involves performing a gap analysis to identify voids, duplications, and miss-matches in position R, R & R's. The forth and last element involves institutionalizing the new/modified R, R & R's.

The first element is achieved in the first few weeks of the project, in which the Administrative Support Supervisors collected all the *Position Descriptions* for the Station and forwarded them to RMG. After review and analysis, RMG develops a basic

template and worksheet to assist station personnel in the next phase of the initiative. The next phase is to document each different job being performed and begin developing the current/proposed R, R & R's. Due to the fact that this phase required significant time to complete, it may be impossible and impractical to snap-shot *what-is* versus what the Station desired for each position. What the Station desires for each position is a thought migration process that comes about because the Station is deeply involved in the multi-faceted improvement process. That is to say, for example, as the station personnel became involved with leadership development or developing work practices, it becomes evident that the scope and authority of some positions needed significant rewriting, so what value is there in writing *what-is* (it only needs acknowledgment that its now different).

After each position is identified, RMG launches and facilitates an extensive effort to developed the R, R & R's. The first activity is to have each Division Supervisor develop the R, R & R's for their respective first line supervisors, engineers (and assistants) and the clerical staff. To expedite the process and to establish some consistency early on, several key Division Supervisors (one from Operations, and one from Maintenance) are selected and heavily supported by RMG. This enables the other divisions to move more rapidly in their development by leveraging off the work already done. The end result is that similar positions, in different divisions, have nearly identical wording and R, R & R's. Once each division is complete (at the first line level), the Division Supervisors participated in a gap analysis process (discussed later in the Section on Gap Analysis).

Upon completion of the gap analysis, the position descriptions are modified and accepted by the Division Supervisors. By completing this activity, the Division Supervisors are now able to write their position descriptions. Again, once completed, the Maintenance/Operation Superintendent and the Plant Manager are able to write and complete their position descriptions.

Institutionalization of the desired R, R & R's for each position is the final phase of this initiative (discussed later in the section on Performance Management).

Gap Analysis & Organizational Change

The gap analysis process formally begins when each division completes R, R & R's for the first line supervision level. While this may be the *official* beginning, this process actually begins when the divisions started documenting the responsibilities/tasks that are actually being done. It is through this documentation process that responsibilities/tasks begin to be identified as in the *gap*. The *gap* can best be described as the area of separation between organizations. Those responsibilities/tasks that fall into this area are often; performed by the wrong organization, performed by both organizations, or not performed at all. The gap analysis process is designed to sort through, and realign the responsibilities/tasks of the organization. The realignment

process ensures divisions are focused on their core competencies, and important responsibilities/tasks are performed in an efficient manner.

Organizational change is often a product of the gap analysis process. While this change is often thought of as hard line changes, it can often just amount to dotted line, team based changes. The organizational change at the station results from the gap analysis process. The Operational Area Management (OAM) team concept is designed and implemented with the purpose of driving down and improving cross-functional communications and decision making to the lowest possible level. While this initiative has fulfills its intended purpose, it has also had more significant and far-reaching benefits. Those benefits include: leadership skills at first line are improved, strong ownership of equipment and areas are established, and cross-functional teamwork is being felt. The implementation of the OAM Teams may very well be the biggest enabling factor for the Station to reach full institutionalization of the new O&M Work Practices.

Examples of Operational Area Management Teams are:

1. Water Treatment
2. Coal Handling
3. Scrubbers
4. Continuous Emission Monitors
5. Unit 1
6. Unit 2
7. Unit 3
8. Ash Processing
9. Mobile Equipment

Performance Management

Most exempt position descriptions have between twenty and thirty-five statements describing the nature of the task or function to be performed. In order to be a useful and actionable description, each statement has to be measurable in terms of frequency, degree, quantity, quality or duration. Most have several measurable dimensions and it is these Measurability Dimensions which form the basis of the Performance Management system.

Once the R, R & R's are completed, the Division Heads, the O&M Superintendent and the Plant Manager each develop a list, showing point by point, how they would measure each element of each person's R, R & R's. These appear on the Performance Management Worksheet with three Excel Macro buttons for each R, R & R element; *Below Expectation*, *At Expectation*, *Above Expectation*. There is a Performance Management Worksheet for every position for which R, R & R's are developed.

At review times, employees are rated on each element of their R, R & R's as to how well they performed the required responsibilities. The average for all R, R & R elements is calculated and an overall outcome *Below, At* or *Above Expectation* is determined. In addition, a summary sheet shows which elements are rated *Below Expectation*. Taken together, improvement to at least *At Expectation* on these elements forms the basis for an individuals' Performance Development Plan, which may also include such items as additional training or education, greater experience, additional challenges such as special projects, or cross-training to other jobs.

After roll-out of R, R & R's and Performance Management, each exempt employee knows specifically what they are responsible for and how their performance will be measured. For the evaluators, the time and energy needed for performance evaluations has decreased by at least 50% and the quality and meaningfulness of the evaluations improves immeasurably.

As positions change through consolidation of responsibilities, changing roles or changing station needs, each Division Head is responsible to keep the R, R & R's for their division updated and to modify the supporting Performance Management System appropriately. The responsibility to do so is included in their personal R, R & R's. Additional support for use and application of these two systems is provided by the Supervisor of Administrative Support.

Developing Leadership

Identified at a very early date in Phase I (assessment), ineffective and inexperienced leadership are typically a concern of station management and a significant contributor to the problems and issues preventing the station from attaining the operating and economic performance levels it desired. In addition to the principles of leadership inferred in virtually every other improvement initiative, the direct approach to leadership enhancement, especially for first line foremen and comparable staff levels, is often indicated. To that end, a series of seminars are developed and implemented by RMG at the station. Attendance may be mandatory for all exempt employees.

One of the major issues almost all of us face in our careers has to do with the differences between management and leadership. Good Managers are not necessarily good Leaders and vice versa. In fact, because of some of these differences, the

requirements of managing are often thought to be in conflict with the principles of leading. For example, managing means following procedure while, sometimes, leading means following your instincts. Management and control are often used together and mean the same thing. Leading, on the other hand, is never about controlling others. Leading is about inspiring, not forcing, others to follow. While these are not always conflicting directions, the point is that being a good Leader means knowing when to stop managing and start leading.

There are no hard and fast rules for this, but the key to effective leadership is self-knowledge. Studies on the subject show that all who are successful have these character traits:

- Integrity (as in directness, straightforwardness, no hidden agendas)
- Knowledge (of self, of subordinates, of the job accountabilities)
- Courage (of your convictions, as in making hard choices and standing behind the people you've empowered)
- Decisiveness (prepared well enough to make a decision so that waffling is avoided)
- Loyalty (especially to your subordinates and the company)
- Enthusiasm (a genuine interest in your people and the job)
- Responsibility (taking and delegating)

Without effective leadership at all levels, an organization suffers from low morale, poor communication, unreliable people, processes and equipment, and general frustration and hopelessness. Without effective leadership, non-legitimate Leaders arise within the organization and try to wrest control away from legitimate authorities, encouraged by the natural desire and need of the rank and file for leadership. With effective leadership at all levels, on the other hand, organizations can blossom:

- Change begins to happen without the usual chaos and disruption
- Innovation begins to crop up throughout the organization
- The losses and confusion from miscommunication become minimal and rare
- Teamwork and a sense of pride begin to spring up spontaneously
- Economic performance improves, leading to a better and more satisfying work life

Few are born knowing the skills of leadership. Fewer still get any training in the area. Rarer still are those who are genuinely good Leaders, even with the addition of both innate and learned skills. We all have different gifts. It is not a character flaw not to be a good Leader. Yet, from first line Foremen all the way up to Plant Manager and beyond, the skills of leadership are required every day, but seldom used. The shame is that almost everyone has the ability to practice leadership, if not brilliantly, at least effectively. The problem is often that experience and circumstance prevent people from acting as Leaders. And, some people simply cannot rise to the required challenge without an undue investment of time and energy.

The solution, then, is to continue to examine yourself and your organization honestly and openly, find the things which block leadership improvement, and change them. But, because leadership means taking on responsibility for significant resources (both human and capital), it sometimes means that unpleasant tasks are absolutely necessary. If you have someone in a job which requires leadership (such as a Foreman) and they can't or won't lead properly, they're in the wrong job. You, as the overall Leader must take action.

People who are required to use leadership who can't or won't are usually very unhappy. And, they're often embarrassed or ashamed to admit this weakness. The frustration and fear they feel at thinking they're trapped in a job which they cannot do, they take out on those around them. Remember, it is not a character flaw not to be a good Leader nor want to be. Many, many fine people seek excellence in performance and contribution through other avenues. Helping that person find a role where they can become a contributor again is good for the person and good for the organization. This is an area of ongoing opportunity for the station and an area with has a tremendous and sustaining payoff for doing the right thing.

3

DEVELOPMENT & INSTITUTIONALIZATION OF WORK PRACTICES

In the next phase of an improvement project a committee is formed with the purpose of institutionalizing standardized work practices for the station. This committee consists of second-line supervisors, representing each division. The second-line level of the station management organization, is basically where plant strategies begin to transform into tactical activities. Due to the fact that each division will be impacted by the new procedures, it is important that each participate to ensure ownership and commitment. An example of the divisions are:

- Plant operations
- Flue gas desulfurization (fgd) operations
- Coal handling operations
- Water treatment (labs) operations
- Technical support
- Administrative support
- Planning
- Mechanical maintenance and electrical maintenance.

This committee typically takes on the name of the Work Practices Steering Committee (WPSC).

Because teamwork and employee participation are a part of the Station's Vision and Values, the use of the word 'Steering' is most appropriate. One of the WPSC's first tasks is to write a charter for itself. This charter is to put the frame-work around what the committee is responsible for and how it intended to operate. To summarize, the WPSC is responsible for the development and institutionalization of all vital work practices required at the Station; to achieve the highest level of understanding of O&M work

practices for itself and the rest of the station's employees; to attain the highest level of participation from the first-line and operator/craftsmen in developing work practices; and to develop, institutionalize and monitor work practice measurements to ensure continuous improvement and the full utilization of the work practices. In essence, the WPSC is the governing body over the controlled and standardized work procedures used at the Station. (A *vital* work practice refers to any activity which must be performed, and performed well, in order to ensure the highest reliability, availability, and profitability of the Station.)

Typical work practices are:

1. Backlog review and purge
2. Work identification and approval
3. Work order planning
4. Long-range scheduling
5. Daily scheduling
6. Work assignment execution and completion
7. Work order closure and failure code analysis
8. Operation's check sheets and routes
9. Work practices measurements

In time, it is expected this collection of procedures grows to includes other activities.

The WPSC is typically lead for the first 9 months by RMG. This leadership structure enables RMG to set the direction for the team, as well as (at times) to create a classroom environment for learning. It is the role of RMG to establish the visions of what the different work practices are and how they all inter-related. This process typically occurs over the course of several weeks prior to beginning development of a particular work practice. It is a vital point that every member of the committee share an understanding of what a particular work practice is and how it works. The result of this up-front work is a written purpose statement.

Example (from Work Order Planning):

The maintenance work planning activity is initiated after a *need for repair* has been identified and documented (formalized) in the Computerized Maintenance Management System. The ability to effectively and efficiently plan this work is a result

of two main factors. The first is, that the *need for repair* be properly identified and the *required up-front information* is provided. The second factor is, that planning practices/standards exist and are consistently followed. If either, or both of these factors are not established and or executed thoroughly and consistently, substantial impacts will result on subsequent activities (work scheduling, work assignment, execution and closure).

Planning practices/standards consist of:

1. Initial work request review, acceptance and assignment to Planners,

2. Field-scoping of jobs,

3. Work order processing,

4. Work order package development (instructional text, equipment/facilities drawings, repair specifications, parts list, material reservation, material staging, special tools and equipment identification, labor estimating, and etc.).

When these practices/standards are established and executed with the clear objective of *making the crew or craftsmen as productive as possible*, efficiency and reliability will characterize the remaining work process steps.

Once the WPSC established the purpose for a work practice, the next step is to develop all the objectives the procedure must fulfill. This activity typically requires as much time to develop as the purpose itself. This is the point where the committee begins to break down the strategic nature of the purpose statement into the tactical elements. It is important to note, the committee only needs to identify those things that they deem are important. The objectives should be items the development teams achieve through their methodology, not the methodology itself. This activity is a balancing act, too specific versus not specific enough.

Example (from Work Order Planning):

- Establishes a documented set of procedures for the maintenance planning practices.

- Ensures consistency of procedures.

- Establishes a guideline how long a work request (WR) will remain in queue (before becoming a work order (WO)).

- Establishes procedure & timing for running the work request report and review.

- Establishes procedure for processing WR based on priority.

- Establishes acceptance and rejection criteria for WR, and defines the process in which rejected WR are returned to approver or purged from the system.
- Establishes a procedure that defines what field scoping is.
- Establishes which jobs require field scoping.
- Identifies all the criteria to be identified during field scoping (parts, labor, other crafts, etc.).
- Establishes a standard form for conducting field scoping.
- Establishes who does field scoping and when to do joint field scoping (with whom; Foremen, craftsmen, multi-craft, etc.)
- Identifies who the back-up people are for the joint field scoping.
- Establishes procedure for allowing time for field scoping.
- Clearly defines the purpose of a work order.
- Establishes the proper entry for each field of the work order.
- Establishes procedures for each type of work order (preplan, repetitive, sub-work order, etc.).
- Defines what a job work package is.
- Defines what an outage work package is.
- Defines the elements included in a work package (drwg., specs., etc.)
- Establishes guidelines when these elements will be included in a work package.
- Establishes the procedure for reserving stock parts.
- Establishes the procedure for providing direct parts.
- Establishes the procedure for pre-staging parts.
- Establishes the area for pre-staging parts.
- Establishes the procedure for reserving special tools, mobile equipment, etc..
- Establishes the procedure for handling clearances.

- Establishes when the work package is given to the Maintenance Foremen.
- Establishes the responsibility for Planning support after the job has begun.

After a purpose and objectives are written, the WPSC is now ready to initiate a development team. The development teams are designed to ensure employee participation, ownership and commitment. These teams are made up from first-line supervision (with some having involvement from the operator/craftsmen level). The purpose behind this is to place the development responsibility into the hands of those who have the working knowledge about what would work in practice and who eventually would have to carry the practice out on a daily basis. The WPSC selected the development team members based on individual's assets, and strive to put people who naturally work together (such as, an OAM Team). This strategy should shorten the team relationship process (bonding, communication, consensus). The WPSC also selects two of its own members to sponsor (coach & facilitate) each development team. In addition to providing the development teams with a purpose and objectives, the WPSC also establishes a development time-frame (30 days, 60 days, etc.) and the expectation that all procedures be documented (rough format is acceptable).

The development teams are launched by the sponsors. The first meetings are used by the sponsors to 'educate' the members of the purpose, objectives, time-frame and how the team is to work. From that point on, the appointed team leaders calls and leads the meetings. The sponsors attended most meeting to ensure the teams are progressing and facilitated where needed. All in all, most of the teams are able to take the initial information and run with it. When the development teams are complete with their assignment (with sponsor concurrence), the teams schedule a presentation with the WPSC. (At this point the team's proposal is placed in a standard format, being cautious not to change the wording or meaning.) These presentations are designed for the first-line foremen to present their proposed methodology for meeting the purpose and objectives set forth by the WPSC. The role of the WPSC in these presentations is to ensure the established objectives are met, not to critique the methodology. If the proposal is acceptable, it is approved in the meeting.

After each work practice is developed, the WPSC develops a communication plan. The committee uses two different approaches during the developmental phase of the project. The first approach is a central meeting, in which all management and exempt employees met in one large meeting. In these meetings, the WPSC is able to discuss the status of the improvement process and the general role of the committee. In addition, the developmental teams are tasked with presenting their newly approved work practice to their peers. The second approach, is for the OAM Team Sponsors (each Operational Area Management Team has a sponsor, sponsors are the members of the WPSC) to present the same information during the regular OAM team meetings. The second approach is used more during the latter part of the developmental phase due to the belief that it is more effective (some of the benefits of the large meeting had run its

course). After each new or modified work practice is communicated, the first-line supervisors are tasked with communicating and training all their respective operators/craftsmen.

Institutionalization of the work practices is an on-going activity that requires constant attention. To maintain focus at the station, several fronts can be initiated. The first is that all first and second-line supervisors can develop Position Descriptions (Roles, Responsibilities & Relationships) and supporting Performance Management Systems. The second is that all work practices can be documented, approved, communicated and provided to every management employee (via the Work Practices Book). The third front is through OAM team Sponsor observation, facilitation and coaching. The forth, final and most important front involves the WPSC migration from the developmental phase of the project to the performance monitoring phase. During this final phase, it is expected that each of the OAM Teams will routinely present their *Common Measurement Package* to the WPSC, along with their corrective action plan. It will then be the WPSC responsibility to remove barriers and ensure the continuous improvement process continues.

Role Of A Work Practices Steering Committee

The *initial* purpose of the Work Practices Steering Committee is to:

- Identify work practices that needed to be established or improved.
- Establish objectives that must be met by each work practice.
- Initiate, establish, direct and facilitate working teams to develop and implement new and modified work practices.
- Identify resources and establish time-tables for working teams.
- Review and approve new and modified work practices to ensure established objectives are attained.
- Assist working teams in implementing new and modified work practices.
- Monitor OAM teams' progress, collect work practice improvement ideas.
- Evaluate work practice improvement ideas and initiate changes.
- Identify, evaluate, develop and implement work practice measurements.

The Mission Statement and Objectives of the Work Practices Steering Committee:

Example Mission Statement:

The Work Practices Steering Committee's Mission is to provide support and direction for continuous improvement of our plant work practices in order to meet our Station Goals.

Example Objectives:

1. Review and approve submitted plant work practices changes.
2. Identify needed plant work practices.
3. Foster plant work practices development.
4. Formulate measures to monitor the success of plant work practices.
5. Develop the leadership for implementation of plant work practices through the sponsorship of the OAM Teams.
6. Administration of plant work practices document.
7. Monitor and ensure the *Health* of the plant work practices through review and understanding of OAM Teams measures, problem analysis and action plans.

Role Of An OAM Team Sponsor

The OAM Team Sponsors are comprised of the members of the Work Practices Steering Committee. The main purpose of the Sponsors is to act as facilitators to the OAM Teams to ensure their continuous improvement, in both, operational aspects of the business as well as teamwork. The Sponsor's primary approach is to continually develop leadership of the team leaders, by acting as their coach. In addition, the Sponsors should facilitate the teams in getting through rough spots and ensuring work practices are followed. Over the long haul, the OAM Team Sponsors will be in a position to nurture the overall continuous performance improvement of the Station by ensuring the optimization of all of its parts (OAMs).

The Role Of The Sponsors:

1. Guidance on holding meetings and directing / influencing change.
2. Advise on how to approach major problems.

3. Provide information on decisions reached by the Work Practices Steering Committee.

4. Solicit suggestions from OAM teams on improvements to the work practice procedures and take ideas back to the Work Practices Steering Committee.

5. Observe the interaction between team members.

6. Ensure the teams know their boundaries (not changing established procedures).

7. Monitoring the progress of the team through the work practice measurements established by the Work Practices Steering Committee. Present measures to the OAM team and explain how to use them. Help OAM team establish a plan to improve their work practices.

8. Keep the OAM team focused on team goals.

Work Practices Book

One of the intended achievements of the Improvement Process is to establish a written set of procedures to govern station work practices. This manual is the result of this achievement. These work practices are designed to guide and direct the work activities performed at the station. By following these practices each department and individual should have a clear understanding of their role and responsibilities as they go about their daily routine.

These practices are written by action teams formed of various members of the station. These action teams are appointed and their results approved by the Work Practices Steering Committee. This committee is composed of the plant Division Heads. The expectation is for all personnel to closely follow the practices as they are outlined. However, this is intended to be a living set of documents. Changes can and will be made to these practices as our industry and company changes, or as a result of continuous improvement (i.e., we simply find a better way). The procedure for changing these practices is included as a chapter of this manual.

The process for developing work practices is shown in the following figure.

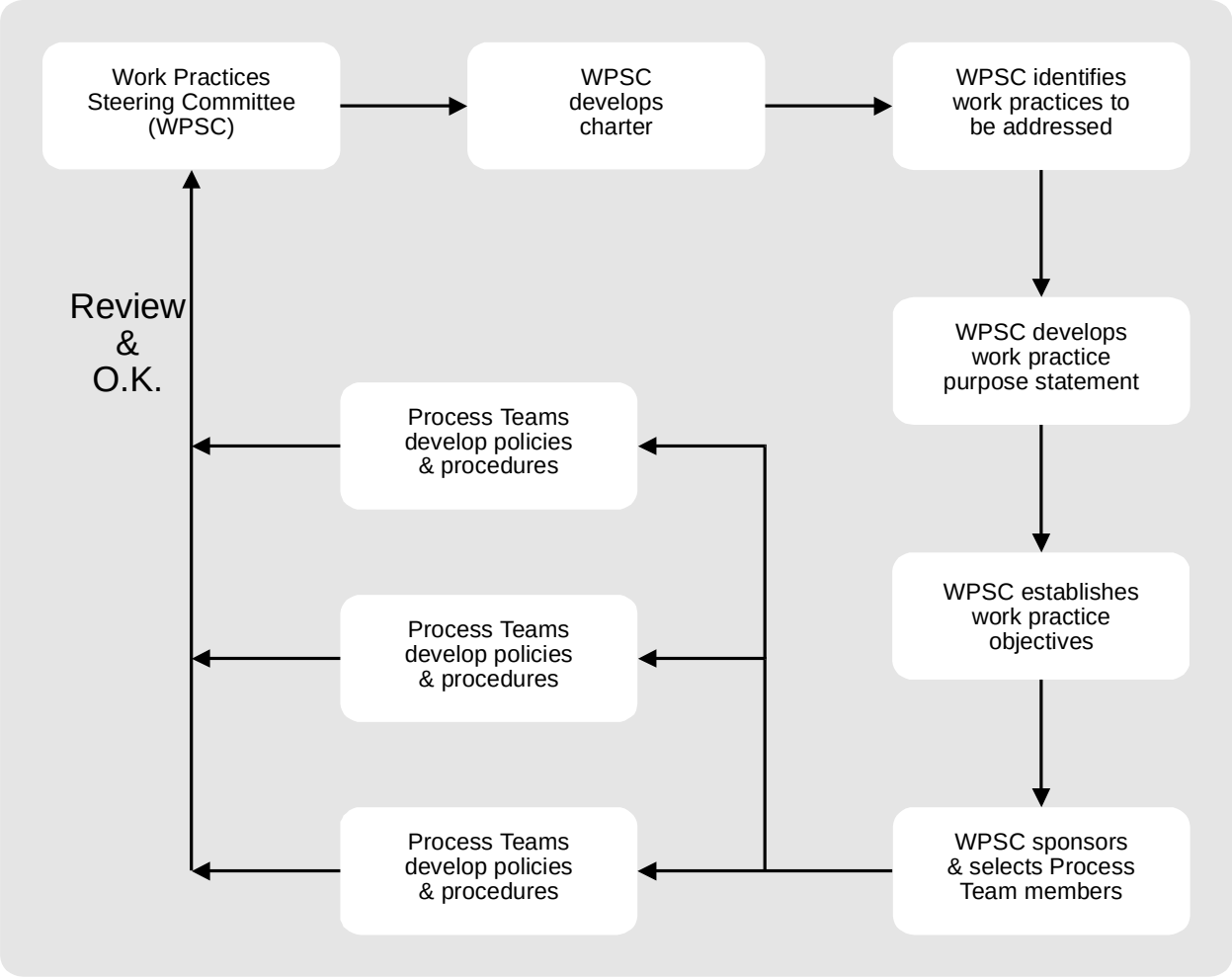

Figure 3-1
Process for Developing Work Practices

Chapter 1 - Change Procedure

The Work Practices Book is a collection of documented guidelines and procedures. These guidelines and procedures are developed under the direction of the Work Practice Steering Committee (WPSC) by teams of *users*. Just as it is important that documented, standard work practices exist; a procedure must be in-place to enable the continuous improvement process to exist for those work practices. It is the goal of the WPSC to continually monitor the effectiveness of established work practices and allow for changes to ensure the Station reaches its full potential. These changes may result from shifts in the industry or the Company and or the *users* just find a better way.

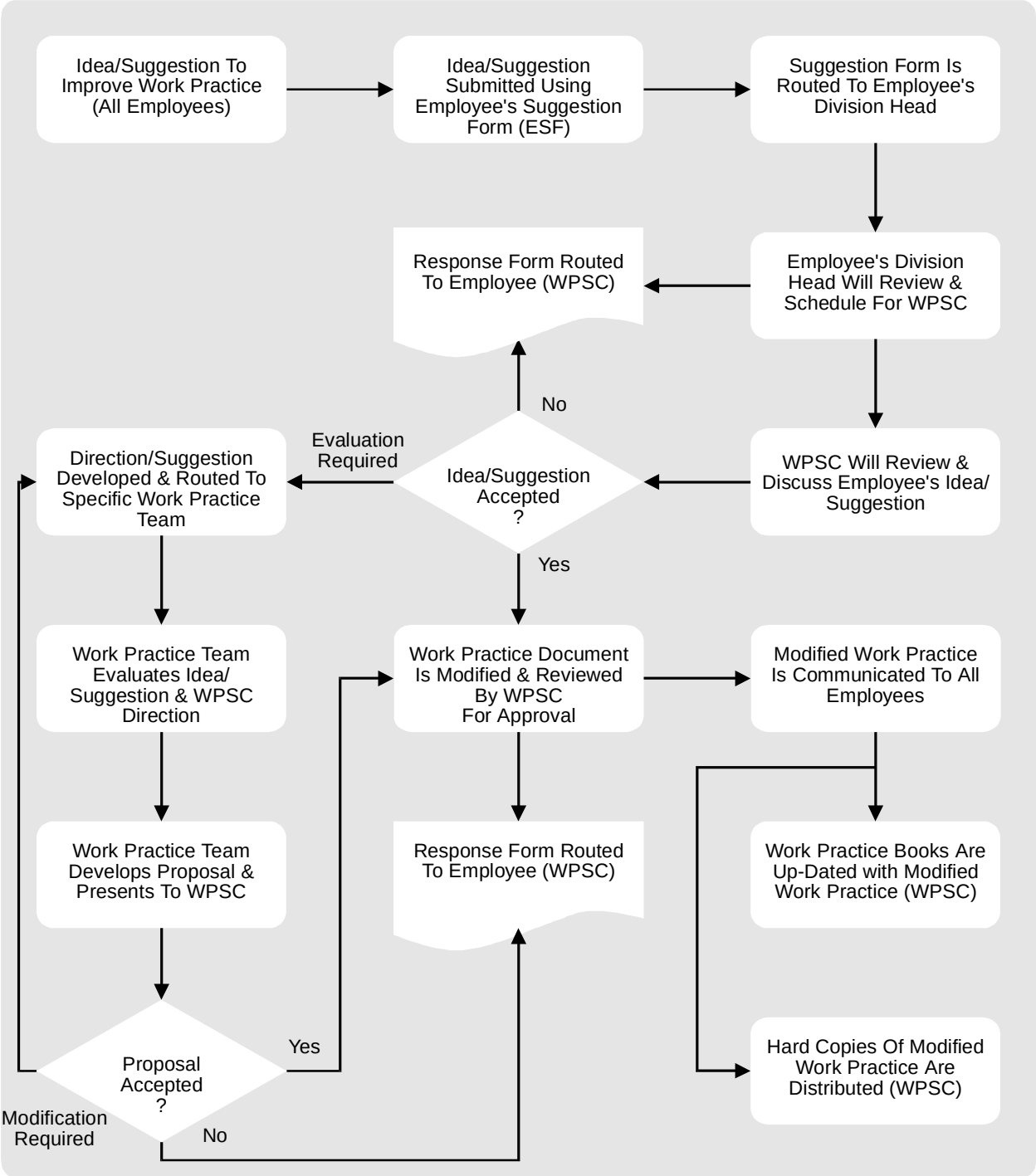

Figure 3-2
Change Procedure Flow Chart

Chapter 2 - Backlog Purge & Review Procedure

As part of the Maintenance & Operations work practices improvement process it is necessary to have an accurate listing of all maintenance requirements in the facility. To accomplish this, a periodic backlog review and purge procedure is developed and implemented. This not only results in an accurate list of maintenance requirements but also facilitate the planning and scheduling activities.

The backlog is a storage place for approved jobs that have not yet been closed. Some jobs never get started, they just aren't important enough or the need for them is eliminated by time and circumstance. For example, a capital project may eliminate the need for the repairs or an acute condition may fade. Jobs that have become irrelevant or impractical should be purged from the backlog where they take up space and divert attention from real priorities.

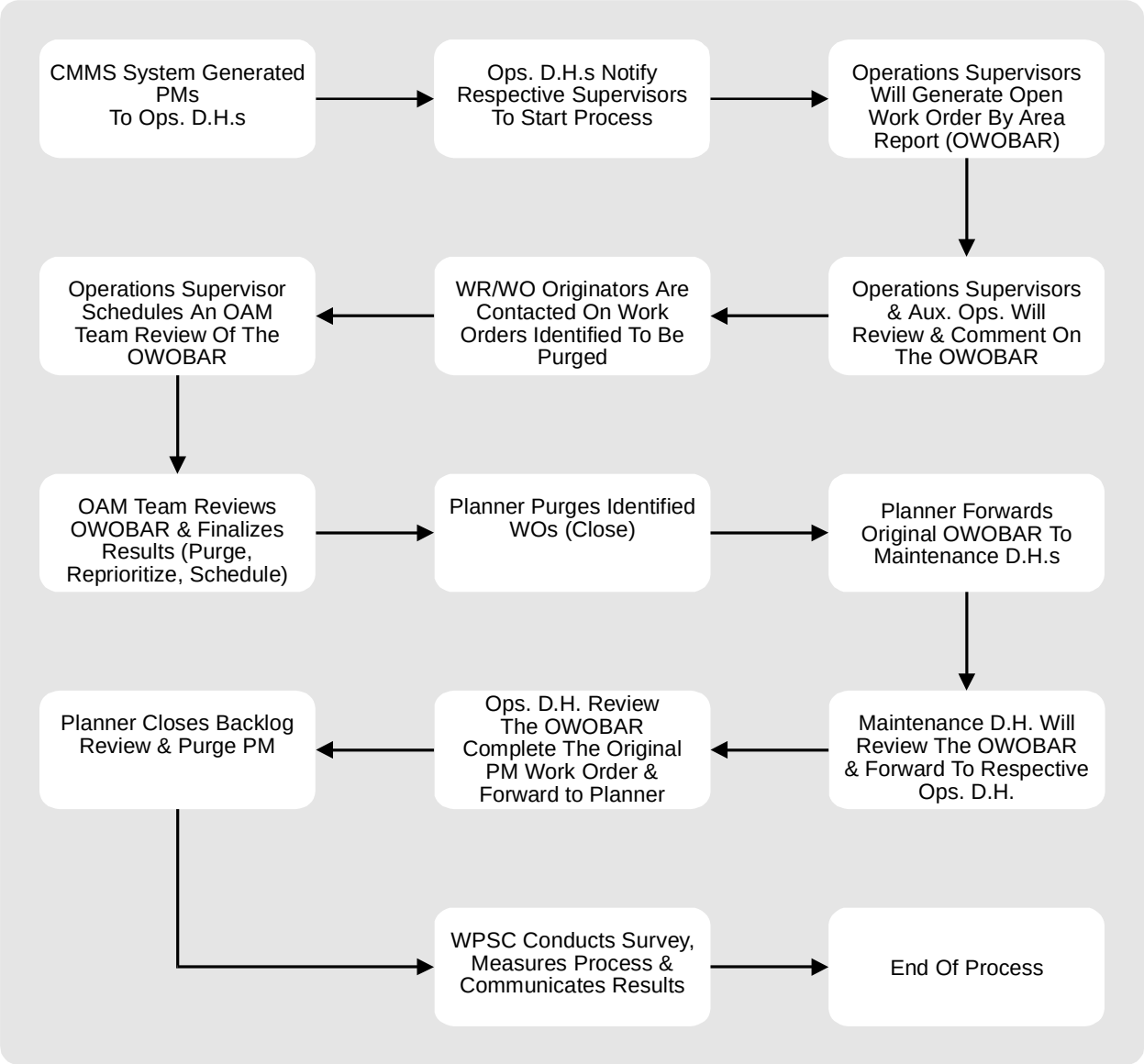

Figure 3-3
Backlog Purge Flow Chart

Chapter 3 - Work ID & Approval Procedure

The first step in any maintenance process involves identifying equipment, systems or facilities needing repair and making that requirement known to the maintenance organization. Being the first steps in the process, means the quality of which these activities are performed have substantial impacts on all the subsequent activities (namely, work planning and work scheduling). Done poorly, this results in a greater number of emergency work orders, additional time to identify equipment needing

repair, increased time to field scope and trouble shoot, potential rework of repairs and less than potential reliability.

Subsequent work activities will be performed in the most effective and efficient manner by:

- following guidelines for early identification of needed repairs
- following guidelines for equipment repair identification tagging
- following minimum standards for initiating a maintenance request
- following minimum standards for approving a maintenance request

This will result in lower operating and maintenance cost and increased reliability.

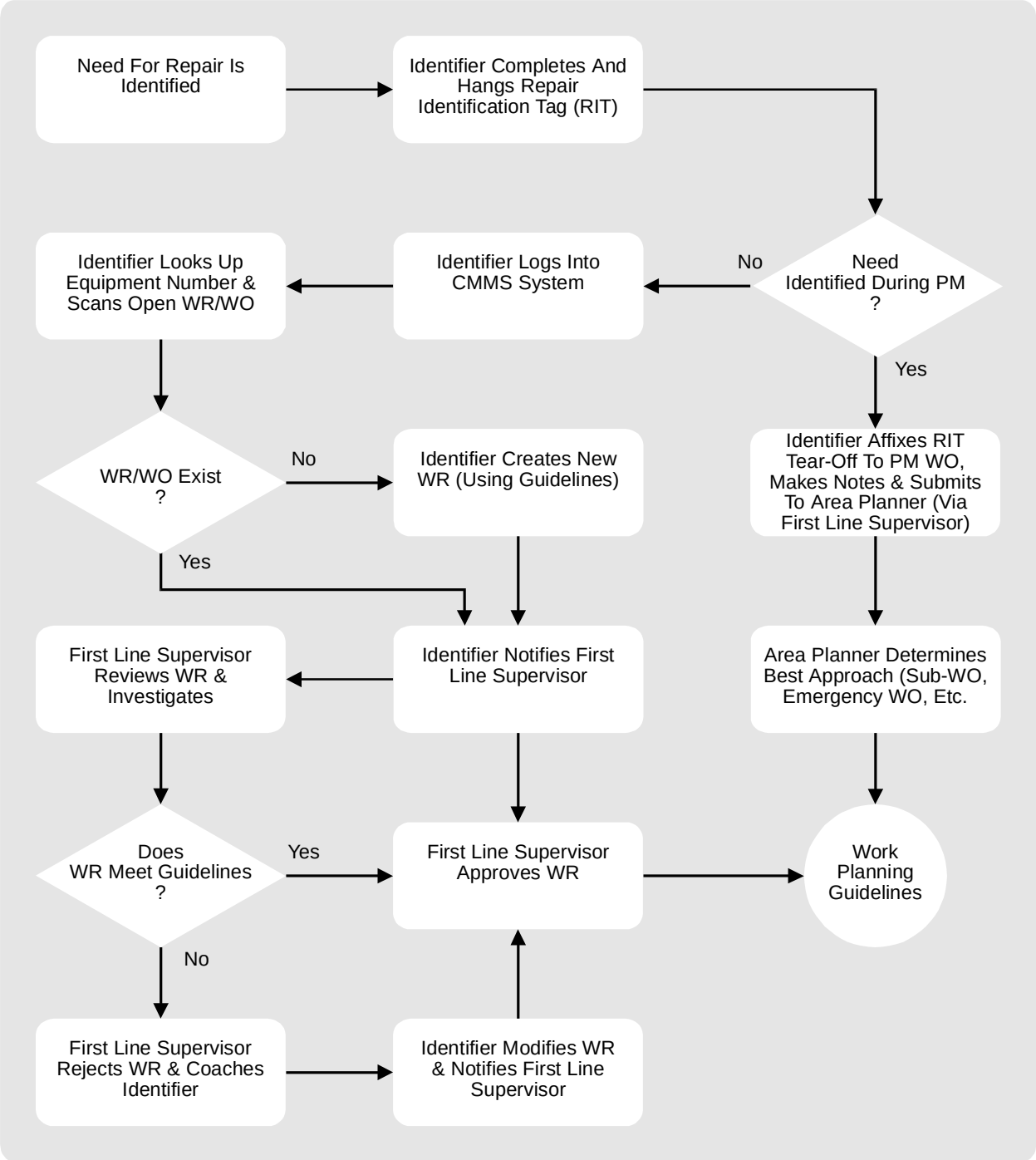

Figure 3-4
Work ID Flow Chart

Chapter 4 - Work Planning Procedure

The maintenance work planning activity is initiated after a *need for repair* has been identified and documented (formalized) in the Computerized Maintenance Management System. The ability to effectively and efficiently plan this work is a result of two main factors. The first is, that the *need for repair* be properly identified and the *required up-front information* is provided. The second factor is, that planning practices/standards exist and are consistently followed. If either, or both of these factors are not established and or executed thoroughly and consistently, substantial impacts will result on subsequent activities (work scheduling, work assignment, execution and closure).

Planning practices/standards consist of: 1. Initial work request review, acceptance and assignment to Planners, 2. Field-scoping of jobs, 3. Work order processing, 4. Work order package development (instructional text, equipment/facilities drawings, repair specifications, parts list, material reservation, material staging, special tools and equipment identification, labor estimating, and etc.). When these practices/standards are established and executed with the clear objective of *making the crew or craftsmen as productive as possible*, efficiency and reliability will characterize the remaining work process steps.

Chapter 5 - Long Range Scheduling Procedure

The purpose of long-range (maintenance) scheduling is to develop an agreed upon plan between Maintenance and its Customers as to how the limited maintenance resource will be utilized over the near term (next several weeks). That is to say, long-range scheduling means defining and agreeing to blocks of work that will be started in each of the next three weeks. The long-range schedule is set by representatives of Maintenance, Operations, Technical Support and any other customer (of Maintenance). The three week schedule *rolls*, that is, each week of the schedule represents the three weeks following the current week, so the three week time frame never shrinks. Long Range scheduling enables the Station to succeed by ensuring that maintenance work is focused on the equipment or systems deemed most important by the Customer (those primarily responsible for production).

Which work should be scheduled first is a matter of plant policy. Preventive and predictive maintenance should be the first items included in each of the three weekly segments, followed by capital work and high priority corrective work. Inputs to the schedules will come from the backlog of sequenced WOs that is updated daily and from the previous week's long-range schedules.

It is important that work being placed on the long-range schedule is work that the OAM Team is committed to accomplish in the week specified. This level of

commitment is necessary to provide credibility to the long-range scheduling process. Work placed on the schedule for week 3 should advance to week 2 and eventually to week 1. Each week, during the long-range scheduling process, the commitment should be verified and barring circumstances, such as, weather, lack of material, etc., the jobs should be moved forward in the schedule. In week 3 the available labor is typically scheduled to approximately 30%+, that increases to 50%+ in week 2 and 80%+ in week 1.

The quantity of jobs the OAM Team is committed to accomplish will ultimately dictate the percentage of available labor hours that are scheduled in each of the three weeks. In weeks when commitment is high (e.g. during overhauls), then the recommended percentages will be exceeded. In weeks when neither Maintenance nor the Customer(s) can commit to enough work to reach the recommended percentages, then a lower percentage is acceptable. However, the target percentage should always be striven for.

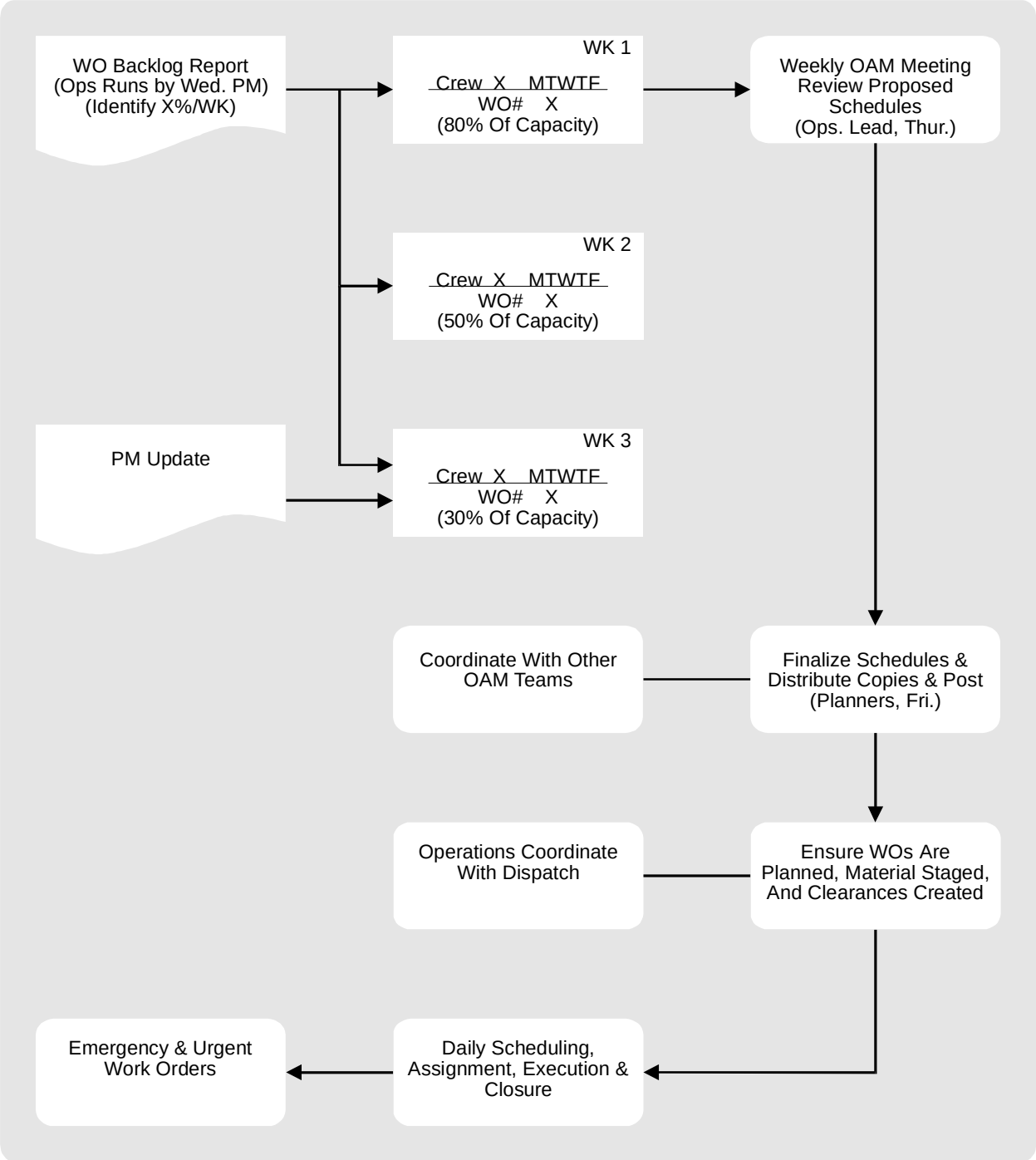

Figure 3-5
Long Range Scheduling Flow Chart

Chapter 6 - Daily Scheduling & Work Guidelines Procedure

A Daily (Crew) Schedule specifies which of today's (this shift's) jobs are assigned to which crew members. The schedule connects specific people with specific jobs, gives the estimated time those jobs should take, allocates a full day's work for each crew member, and states the amount of work that should be accomplished if the job will not be completed on that shift. The Daily Crew Schedule is developed from the Long Range Schedule, and the ready (*R*) status work order backlog.

The Daily Crew Schedule can be developed electronically or on paper, but a paper copy is always generated at some point. The paper copy is used by the Maintenance Foremen to assist in work assignment and job follow-up. It should also be copied to the Customers (Operations Supervisors or Foremen) to communicate what Maintenance will be doing on each shift.

The Daily Crew Schedule is prepared today for tomorrow. Ideally, tomorrow's work will be reviewed with the crew before they leave for each day. For 2 and 3 shift maintenance operations the off shift schedules can be left loose, i.e., less than 100% of available labor hours can be scheduled the day before to accommodate unplanned or carryover work. However, by the time the shift begins, the schedule must be 100%.

No matter how well the long-range and daily schedules are planned and coordinated, success cannot be achieved without a planned and disciplined approach to executing the work. Work assignment, execution and completion is the part of the work practices that deals with actually doing the work. Done poorly, this results in the inability to complete schedule commitments, poor utilization of a limited maintenance resource, loss of confidence from (Maintenance) customers, higher operating & maintenance cost and potentially less reliability. The scope of this part of the work practice starts when a Foreman plans to start a job, till the job is complete and the Foreman turns in the work order to the area Planner to be closed.

Planning the plan, and executing the plan will result in lower operating and maintenance cost and increased operational and organizational reliability.

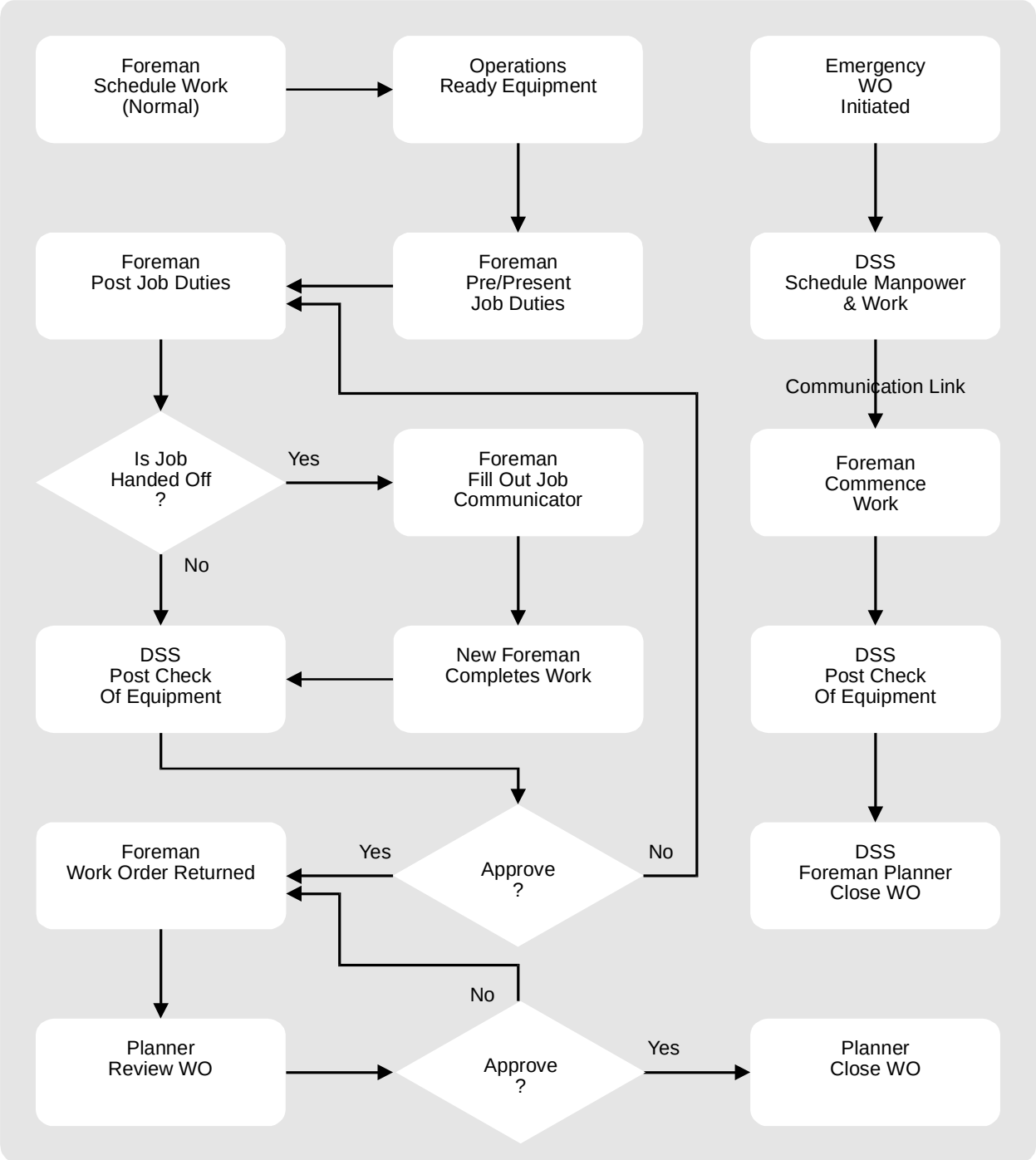

Figure 3-6
Daily Scheduling Flow Chart

Chapter 7 - Work Order Closure & Failure Code Analysis Procedure

The last step in the maintenance work life-cycle involves work order closure and failure analysis. The process of work order closure starts after a work order is completed and the work has been accepted by the customer. Once completed, most work orders will contain very detailed and important information regarding the inspections and repairs that were made. This information, in most cases, will be documented by the person(s) who carried out the work, thus giving a first hand account of what was found, and what was done to repair the situation. While this information does not provide much value in the immediate sense, it does provide historical data for future reference and root cause analysis. The benefits of historical data is three-fold. The first, is that it expedites the planning process for future, similar jobs. The second, is that it increases the accuracy of planning estimates for labor requirements and material, tools and special equipment needs. The third and most important aspect, is that with proper documentation (failure codes) and teamwork (cross-functional membership), maintenance cost can be reduced through the utilization of a root-cause-analysis and corrective action effort.

Therefore, to ensure the continuous improvement of maintenance planning and the Station's equipment/system's reliability, guidelines need to be established and followed for work order closure and failure code analysis.

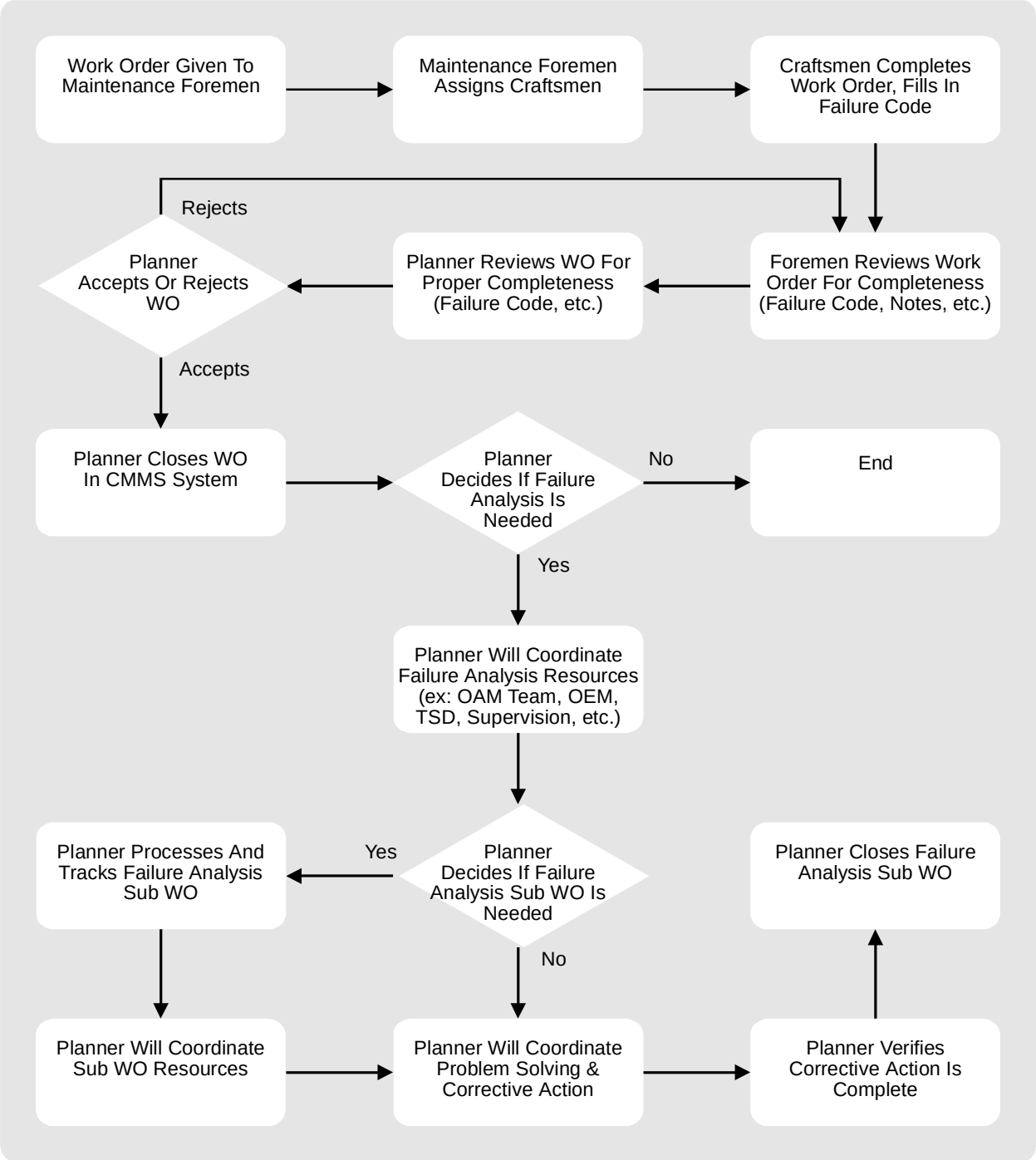

Figure 3-7
Routine Failure Analysis Flow Chart

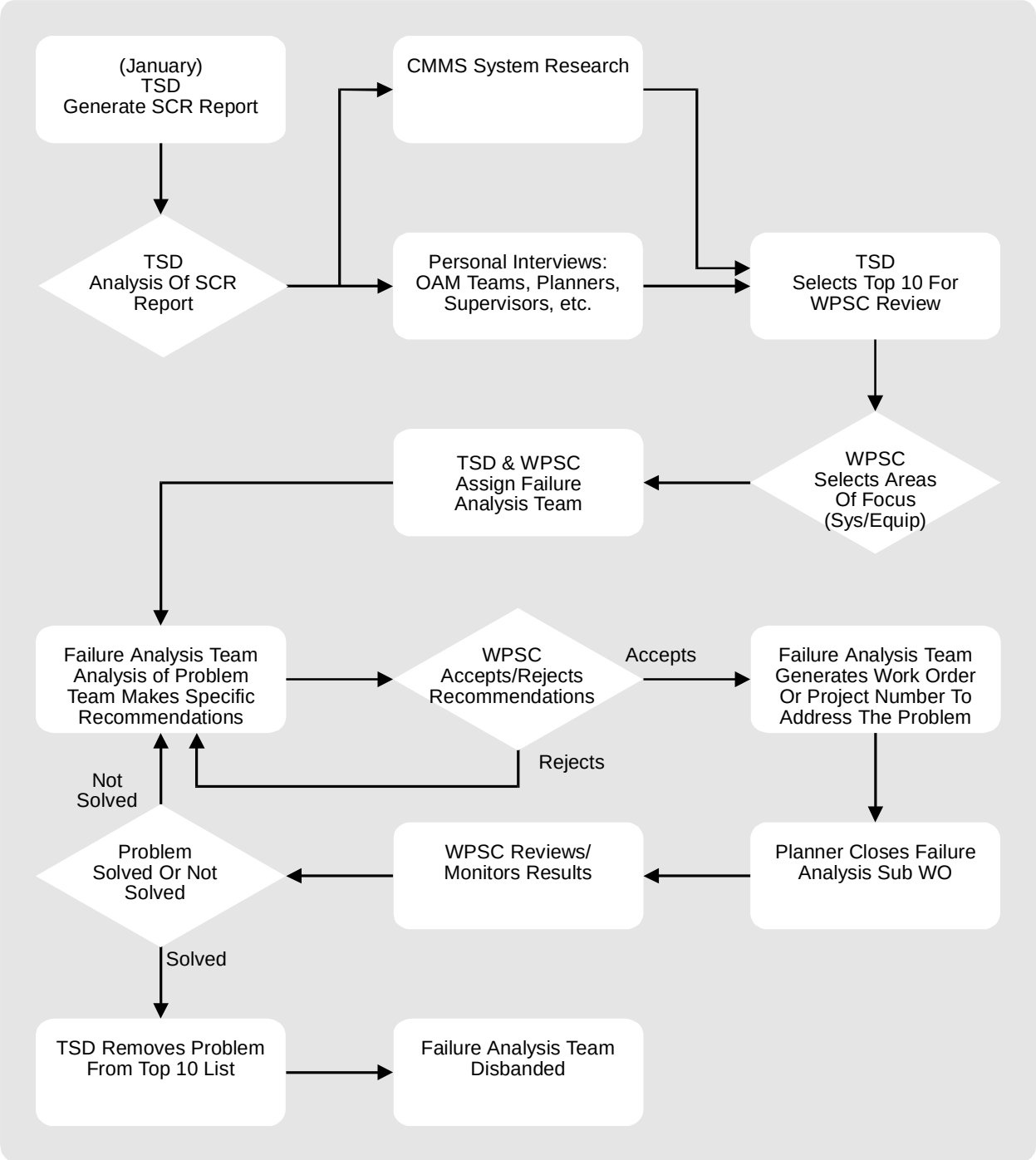

Figure 3-8
Long Term Failure Analysis Flow Chart

Chapter 8 - Operation's Cheeksheets & Routes Procedure

As part of the work practices improvement process, it is necessary to document the Operations personnel's routes, frequency and the check sheets completed on such routes. Operations should have defined and established routes that define the order and frequency of equipment checks, and check sheets that define the type of monitoring and work done on each piece of equipment. The check sheets should designate High-Low action limits that indicate explicitly what normal and abnormal conditions are and what should be done if abnormal conditions arise. Check sheets and routes are the formal program Operations uses to check equipment operation, process flow and to identify work early.

Check sheets and routes should be evaluated at regular intervals for effectiveness and ease of use. They need to kept up to date. Their effectiveness depends upon the quality of the routes and check sheets (i.e., how well they match up with maintaining system functionality), discipline (communication of expectations, audits), and analysis (using data to evaluate whether the program is having the intended effect). Check sheets are a form of work history, and as such they should be filed for future reference.

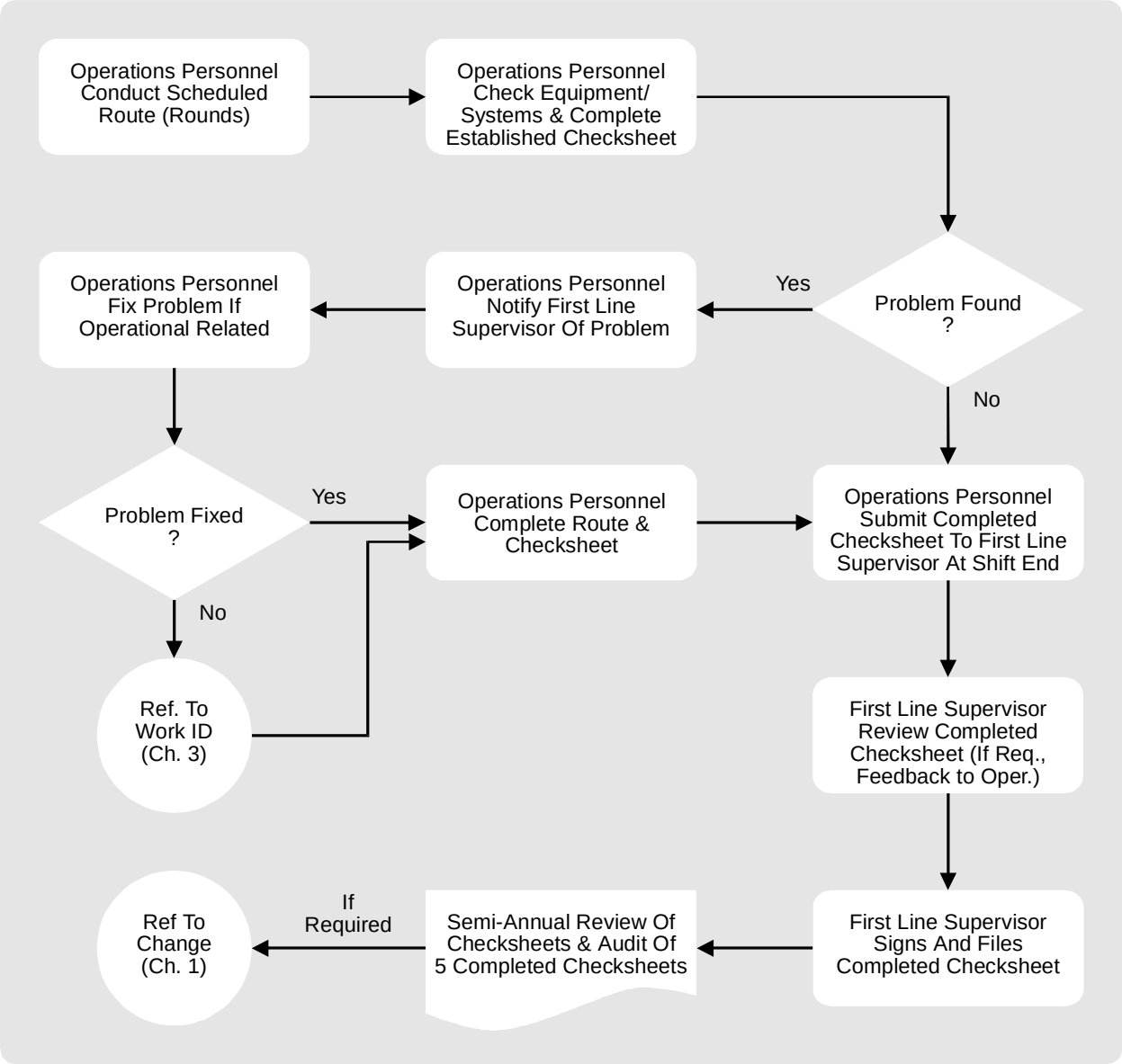

Figure 3-9
Checksheets & Routes Flow Chart

Chapter 9 - Work Practices Measurements Procedure

Measurements are the basis of continuous improvement and decision making. The purpose of measuring the process is to improve upon the process and to aid the OAM Teams and Station Management in making decisions regarding when and how maintenance activities are performed. The measurements must be viewed in that light, the opportunity for improvement comes from understanding the root cause of the problem and then working to rectify the problem. Superficial fixes that make the

measurements look good do not address the core of the problem and do not provide any real benefit to the organization. Data integrity is very important.

Over time, certain aspects of the process may no longer require measuring because there may be little room for improvement left. When this occurs those measurements may be dropped and new ones added to monitor other aspects of the process.

Chapter 10 - Stock & Direct Parts Purchasing Procedure

An important step in the maintenance process is to have the correct tools, parts, and services available when required to complete a job. The procurement of stock and non-stock parts along with outside services must be completed in a timely manner. Done correctly, this results in a decrease in the cost of materials/services and an increase in maintenance productivity.

4

CONCLUSION

Before an improvement effort a station typically has an overall Value Based Maintenance Grid score of 2.3 out a possible (perfect) 5.0. At the end of an improvement, the overall Grid score typically rises to 3.6 out of 5.0; a 55% improvement! Row by row, the following table shows an example of the degree of improvement and the Grid graphic which follows depicts it visually:

Table 4-1
Average Row Score

Row Number	Row Title	11/95	6/97	Change
1	Work Order	2.6	4.1	+59%
2	Ops/Maint Teamwork	2.7	2.9	+8%
3	Materials	2.5	3.0	+22%
4	Work Scheduling	1.4	2.0	+43%
5	Work Management	1.8	4.0	+115%
6	Work Mgt. Tools	2.0	4.1	+103%
7	PM & PDM	2.4	3.1	+30%
8	CMMS	2.0	3.2	+65%
9	Cost Eff. Technology	1.8	4.4	+142%
10	Work Culture	3.7	4.5	+20%

Value-Based Maintenance Grid After An Improvement

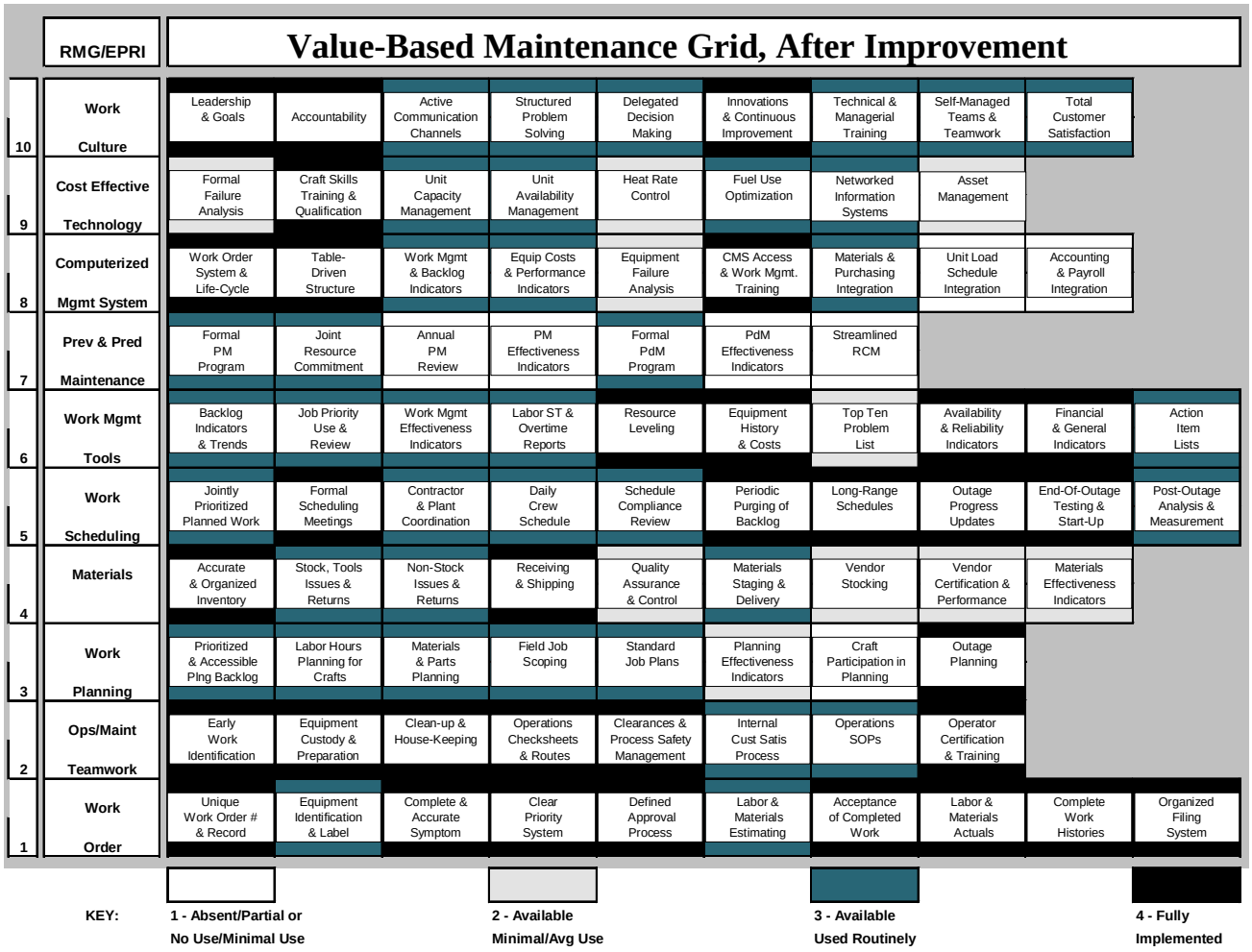

Figure 4-1
Value Based Maintenance Grid After Improvement

Opportunities Remaining

Using the RMG/EPRI Grid as a base-line of Best Practices, and by re-assessing the Station against the criteria behind the Grid, some areas are listed where opportunity still exists after the improvement effort. By focusing future activities into these areas, RMG feels that the station will truly become *Best in Class*. An example list of future opportunities follows:

- Label all plant equipment with Equipment Identification Labels.
- Implement Customer Satisfaction Measures.
- Increase Standard Operating Procedures (SOPs) for operations equipment.
- Improve accuracy of labor estimating on work orders.
- Improve accuracy of materials and parts planning for work orders.
- Increase field-scoping of job during the planning process.
- Begin auditing of planned work order packages to improve quality.
- Increase craft participation in planning.
- Utilize critical path diagrams & scheduling for outages.
- Implement 'tools' control procedure.
- Begin monitoring and charting of expedite delivery charges for parts and materials.
- Implement Quality Assurance / Quality Control Program for received parts and materials.
- Increase use of vendor stocking programs.
- Institute a vendor certification program.
- Monitor, chart and communicate storeroom data (for example, inventory accuracy, # stock issues, stock issues fulfilled, etc.).
- Generate and communicate *Top Ten Problem List*.
- Perform annual review of PMs.

- Implement PM effectiveness indicators.
- Implement PDM effectiveness indicators.
- Implement RCM program.
- Establish formal failure analysis.
- Implement on-line heat-rate monitoring and control.
- Increase technical and managerial training and development.

Project Conclusions

An improvement project succeeds in making changes for the better. The Value-Based Maintenance Grid scores increase from 2.3 to 3.6 over a year and a half project, an improvement of 55%. Non-fuel O&M costs decline. Availability goes up from a five-year average. Forced outages decrease with the EFOR dropping from a five-year average. An effective leadership team is established at the head of every major station function. The leaders and their subordinates have a full kit of effective tools and performance metrics to draw upon. These are the highly visible symbols of change at the station.

Not as visible, but with at least as much power to maintain and further the transformation process, are another set of symbols. Problems and conditions which were counter-productive transform into various stages of retreat. The union, at first suspicious of the change process, typically becomes an active supporter. Personal differences are much less destructive of productivity as the mechanisms of constructive confrontation play an increasing day-to-day role. Expectations that people will perform predictably rise throughout the station while tolerance and acceptance of poor performance and bad behavior falls to almost zero. Both communication and problem solving skills improve, and their routine use increases, throughout the work community.

These are the observed, overall changes which take place at a station. They are the result of implementation of the eleven primary deliverables outlined in the original Improvement Proposal. These deliverables are:

- Identification and communication of Station vision, mission, values and direction; the process and actions necessary to develop a Work Culture capable of supporting (i.e. - Foundation) the station’s improvement objectives

- Definition of specific roles, responsibilities and (customer/supplier) relationships; the work of sorting out and communicating who is responsible for what in terms of station operations

- Implementation of an organizational structure which promotes full accomplishment of these R, R & R's; the right people heading up the right functions so that both the near and long-term decisions made every day would be consistent with achievement of the station's goals and vision

- Identification of key performance measures for individuals and the station; accomplished through the development of broad-based Key Performance Indicators, showing overall station health on a short-cycle basis and the development of individual and team performance measures for every single step and process in the Work Practices cycle. The narrower measures build up to the overall KPI's which are used by management to practice management by exception

- Setting of specific goals for each key performance measure; developed by establishing both historical and current performance norms to identify measures with exceptional outcomes

- Establishment of short-cycle measurement of performance and results; which is that once measures are established for individuals, events and processes, they had to be accurately measured and communicated with established approaches to corrective decision-making and individual coaching

- Development of a system of accountability; achieved by developing an objective methodology to evaluate and improve individual performance using the performance management system which specifies how each individuals R, R & R's will be evaluated and provides periodic (semi-annual) feedback to individuals on their performance, including corrective and developmental action plans

- Definition of customer/supplier relationships and measurement of satisfaction levels; individually incorporated into personal R, R & R's and measured through the performance management system and defined for functional groups and teams through their work practices measurements and key performance indicators

- Improvement of all forms of communication; integral to every improvement initiative as a foundation element addressed directly in every meeting and communiqué

- Establishment of effective work management methods, practices and disciplines; as in the Work Practices guidelines covering every direct and supportive aspect of the work process life-cycle

- Development and use of formal problem solving processes; every action team, in addition to developing recommendations to resolve issues or establish procedures, has practiced very specific formal problem solving and feedback processes

When the Improvement Project is over, by no means is the improvement process finished, nor will it ever be. The act of creating the improvement structure is complete. Now the task is maintenance and refinement of what's already in place, ensuring continuous improvement and continuous innovation. The hard work of the process so far, plus continuing effective effort, is what ensures the station's future as a world class organization.