National Institute of Standards and Technology
U.S. Department of Commerce

Implementing Ageing Reactor Management: "If it were easy, everyone would do it"

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Disclaimer

Certain commercial equipment, instruments, or materials are identified in this study in order to specify the experimental procedure adequately. Such identification is not intended to imply recommendation or endorsement by the National Institute of Standards and Technology, nor is it intended to imply that the materials or equipment identified are necessarily the best available for the purpose.

NIST NCNR

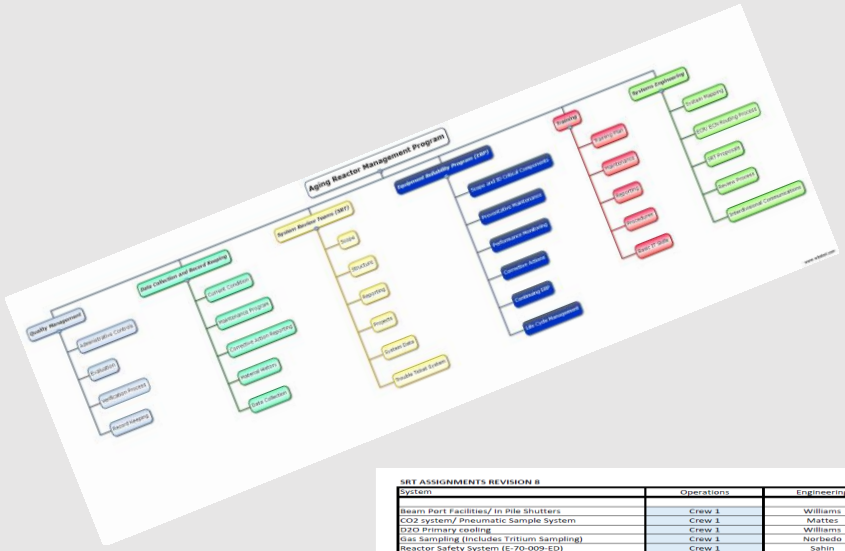
Ageing-reactor management (ARM) is the application of engineering, operation, and maintenance strategies to control, within acceptable safety/ reliability limits, the age degradation of structures, systems, and components (SSC) of nuclear reactors.

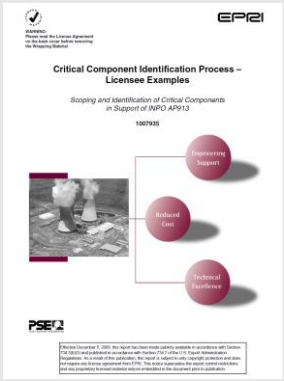
Ageing Reactor Management

- The NCNR identified the need of a robust aging reactor management program.
- A program manager was identified and assigned to the task.
- The program manager researched and recommended through presentation the path that the NCNR should follow going forward.
- The pathway was accepted by upper management and the program manager got to work.

- This is where the fun begins…

Timeline for What is Happening





NCNR Aging Reactor Management

Equipment Reliability Program: Reliability Centered Maintenance

Reliability Centered Maintenance (RCM) can be described as a process to determine the maintenance requirements of any component in its operating system.

The RCM methodology recognizes that not all equipment in a given system is created equally in the eyes of facility safety or reliability. It recognizes that equipment design and operation differs and that equipment will have a higher probability of failure based on different degradation factors. RCM is a systematic approach to evaluate a facility's equipment and resources to best utilize personnel and financial resources. The result is a high degree of facility reliability and cost effectiveness. Highly performing facilities typically use the following breakdown in maintenance approaches:

- <10% Reactive
- 25% to 35% Preventative
- 45% to 55% Predictive

The predominate methodology of these high performing facilities is predictive maintenance and is the cornerstone of the RCM strategy. As with any maintenance strategy there are advantages and disadvantages but the RCM strategy will allow management to more closely match resources to needs while improving reliability and decreasing costs.

Advantages:

- Can be the most efficient maintenance program
- Lower costs by eliminating unnecessary maintenance or overhauls
- Reduced probability of sudden equipment failures
- Able to focus maintenance activities on critical components
- Increased component reliability
- Incorporate root cause analysis

Disadvantages:

- Can have significant startup cost, training equipment, etc.
- Savings potential not readily seen

Implementation Plan

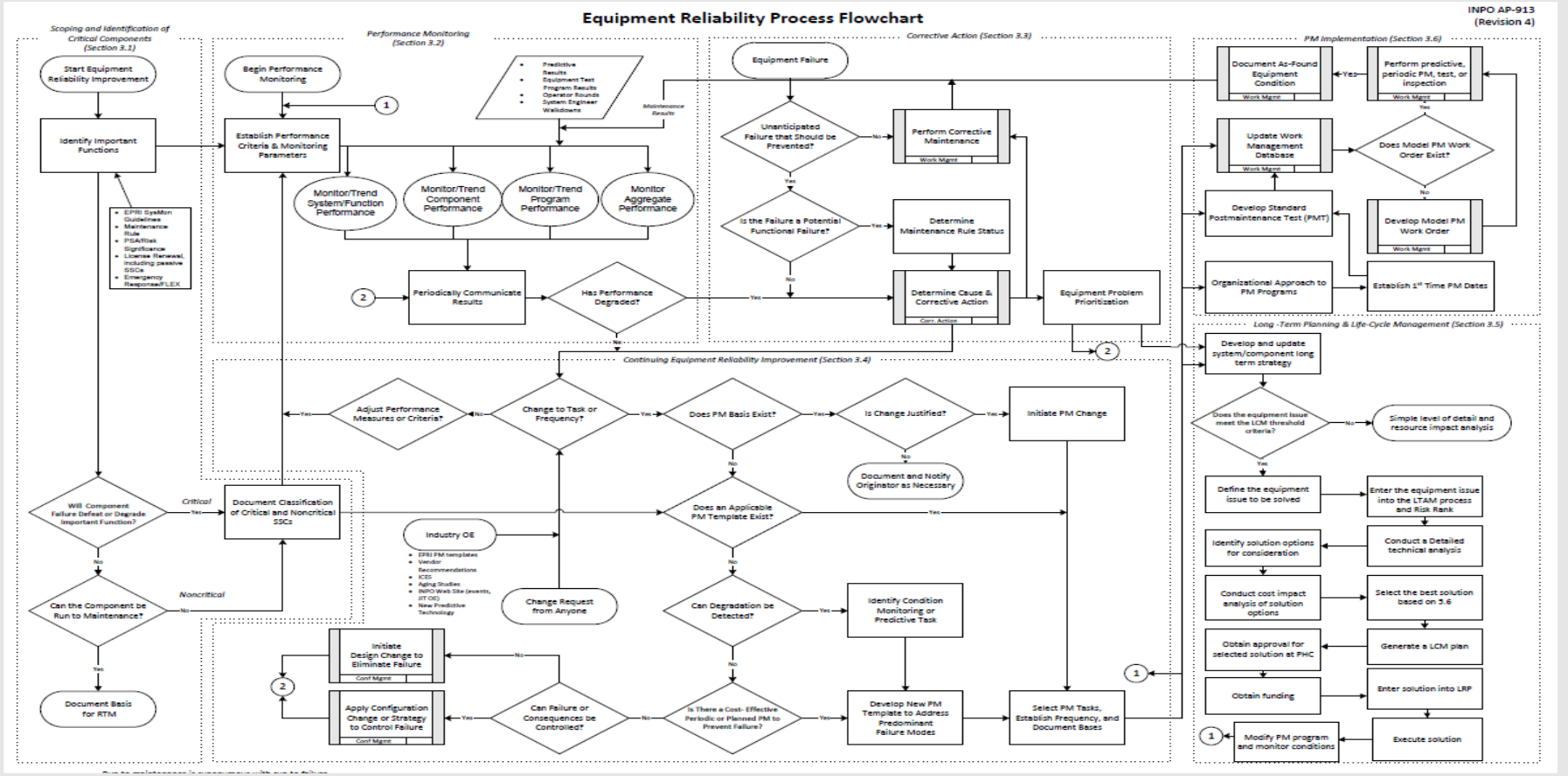
The implementation plan is to work within the efforts of the System Review Team (SRT) Program as well as utilize the management of the nev dministrative Supervisor (AS) position. The SRTs are responsible for determining maintenance need particular system and the AS will be responsible for planning and implementation. T list that will provide the SRTs and management with a pathway to integration:

SRT ASSIGNMENTS REVISION 8

System	Operations	Engineering	Engineering	Health Physics	SRT Lead
Beam Port Facilities/ In Pile Shutters	Crew 1	Williams	Liposky		Bobik
CO2 system/ Pneumatic Sample System	Crew 1	Mattes	MacDavid		Hudson
D2O Primary cooling	Crew 1	Williams	Strader		McDonald
Gas Sampling (Includes Tritium Sampling)	Crew 1	Norbedo	Uzan	Barvitskie	Griffin
Reactor Safety System (E-70-009-ED)	Crew 1	Sahin	Strader		Hudson
Shim Arms and Shim Arm Mechanisms	Crew 1	Liposky	Norbedo		Griffin
Confinement Building	Crew 2	Strader	Liposky		Brady
D2O Purification Loop / D2O Experimental Cooling	Crew 2	Mattes	Suthar		Blazek
D2O and H2O emergency cooling	Crew 2	Liposky	Middleton		Fitt
Helium Sweep and Supply	Crew 2	Khan	Uzan		Fitt
Storage Pool/Storage Pool Cooling	Crew 2	MacDavid	Williams		Brady
Thermal Shield/Thermal Shield Cooling System	Crew 2	Norbedo	Khan		Blazek
Refueling/Panel/Cannon	Crew 2	Strader	Suthar		Slaughter
Compressed Air Systems	Crew 3	MacDavid	Middleton		Jones
Control Console	Crew 3	Sahin	Uzan		Jones
Demineralized Experimental Cooling Water	Crew 3	Khan	Sahin		Colvard
Thermal Column/Thermal Column Cooling System	Crew 3	Middleton	MacDavid		Colvard
Vessel and Internals (fuel, thimbles, etc.)	Crew 3	Williams	Eyers		Clark
Water Machine	Crew 3	Strader	Williams		Berg
Cold Source/Cryogenic Facilities	Crew 4	Eyers	Khan		Halacsy
D2O Leak Detector System	Crew 4	Middleton	Sahin		Heller
Electrical Supply	Crew 4	MacDavid	Main		Burmeister
Liquid Waste System	Crew 4	Strader	Suthar	Remley	Halacsy
Radiation Monitoring	Crew 4	Sahin	Eyers	Walton	Campbell
Secondary Cooling (Include Cooling Tower)	Crew 4	Sahin	Suthar		Campbell
Ventilation	Crew 4	Liposky	MacDavid	Remley	Burmeister

Crew 1	Crew 2	Crew 3	Crew 4
McDonald	Slaughter	Berg	Heller
Bobik	Blazek	Clark	Burmeister
Griffin	Fitt	Colvard	Halacsy
Hudson	Brady	Jones	Campbell

What is Happening?



Death by Flowchart

- Prioritization
  - Everything is running fine. What's the problem?

- Funding
  - There is no large influx of capital to fund this project. (Refer to above)

- Amount of Work Required
  - There is a huge amount of work required to build the program

- Size of the program
  - The breadth of the program touches multiple facets of the NBSR

Problems with Implementation

- Stalling out?
- Not moving fast enough?
- Organizational resistance?
- NO money?
- NO people?
- NO time?

Now what???

- I would like to see the NCNR operate through the next relicensing period with no unexpected long shutdowns. (2029)
- I would like to see our reliability increase.
- I would like to have enough infrastructure in place that the program runs itself and is fully integrated into our day to day operations.
- I would like to make sure that all resources are maximized and leveraged efficiently.
- I would like to continue to find innovative solutions to our challenges.
- I would like this program to be an asset to the TRTR community.

PROGRAM GOALS

- Create an organizational vision for both the long-term and near-term futures

- Get a Program Manager
  - Leader of change
  - Leader of People
  - Results Driven
  - Deadline Oriented
  - Business Acumen
  - Coalition Building Skills

- Create a plan for execution
- Blah, Blah, Blah…

- DO THE WORK!!!

Where to begin?

What challenges are you facing?