CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON SEG PLANT

PLANT OPERATING MANUAL

VOLUME 1

PART 2

PLANT PROGRAMS

PLP-055

OUTAGE RISK MANAGEMENT

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1.0 PURPOSE

1.1 The purpose of this procedure is to provide the Site Management standards for the safe scheduling of planned outages during which Unit 2 is placed in cold shutdown or refueling. Checklists are provided for use to insure outage safety via redundancy of equipment, administrative controls, contingency planning, or a combination of these methods. Processes for an Independent Outage Risk Assessment and for changing an approved Outage Schedule are also included.

For forced outages during which Unit 2 is placed in cold shutdown or refueling, schedules are to be developed to comply with this procedure as soon as reasonably possible. The Independent Risk Assessment Reviews and PNSC Reviews are also to be conducted as soon as reasonably possible.

2.0 REFERENCES

2.1 NUMARC 91-06, Guidelines for Industry Actions to Assess Shutdown Management, December 1991

2.2 INPO 92-005, Guidelines for the Management of Planned Outages at Nuclear Power Stations

2.3 AP-004, Procedure Control

2.4 AP-022, Document Change Procedure

2.5 Administrative Guides and Procedures 7-02, Outage Management Manual

2.6 Adverse Condition Report 92-326

2.7 H.B. Robinson Steam Electric Plant Operating License and Technical Specifications

2.8 Nuclear Fuels Section Design Activity 93-0046, Cooldown Time Required to Suppress Boiling Assuming Loss of All RHR

2.9 MMM-001, Maintenance Administration Program

3.0 RESPONSIBILITY

3.1 Manager - Outage Management: This individual is responsible for developing the Outage Schedule in compliance with this procedure. He is responsible for obtaining the pre-outage Plant Nuclear Safety Committee (PNSC) Reviews for planned outages in which the plant is placed in cold shutdown (see Section 5.3). He is responsible for initiation and administration of the Outage Schedule Change Risk Review Process following the Independent Risk Assessment of the Outage Schedule.

3.2 Plant Nuclear Safety Committee: The PNSC is responsible for a pre-outage review of the schedules and Independent Outage Risk Assessment results for planned outages during which Unit 2 is placed in cold shutdown. The purpose of this review is to verify that the high level scheduling logic for the outage complies with this procedure. Detailed reviews of the scheduling for individual work activities are not expected during this review. The PNSC is responsible for reviewing the Contingency Plans for Higher Risk Evolutions identified pre-outage. Once the Independent Outage Risk Assessment is completed, the PNSC is responsible for reviewing schedule changes that result in Higher Risk Evolutions including the necessary Contingency Plans.

3.3 Site Management: Site Management personnel are responsible for planning and conducting outage activities in accordance with this procedure and the approved Outage Schedule. Site Management is responsible for providing appropriate qualified personnel to assist with the Independent Outage Risk Assessment Process and Outage Schedule Change Risk Review Process. This assistance will be as negotiated with the Manager - Outage Management or his designated representative.

4.0 DEFINITIONS

4.1 AVAILABLE (AVAILABILITY): The System, Structure, or Component is to be either in service providing the shutdown safety function, or capable of being quickly placed in service automatically or by use of routine manual actions such as starting pumps or opening valves which are permanent plant equipment. Automatic features may be defeated except that those appropriate to cold shutdown condition are to remain in service (i.e., EDG start and loading on Emergency Bus Undervoltage). If the System, Structure or Component is in service providing the Shutdown Safety Function, then some components may be defeated in such a manner that the ability to maintain the Shutdown Safety Function is not degraded. The portions of the Service Water, Component Cooling Water, Residual Heat Removal, Emergency Diesel Generator, Emergency Bus, and DC Power Systems providing Shutdown Safety Functions must be operable seismically to be considered available. The following examples are provided to clarify this definition:

- An EDG may be considered available in the following case: An EDG is capable of automatic start and loading on the respective Emergency Bus. The EDG support systems, such as Service Water, may be in a status less than that required by the Technical Specifications but, the required portions are to be operable seismically and are to be adequate for EDG Operation. Testing of the EDG to remain available should be considered prior to removing the other EDG from service but routine/daily testing of the available EDG is not required when the other EDG is out of service (Ref. 2.6).

- A Shutdown Safety Function flow path may be considered available when a Motor Operated Valve is deactivated such that the Shutdown Safety Function would be satisfied when required.

4.0 DEFINITIONS (Continued)

NOTE

Definition 4.2 differs somewhat from the definition of Closed Containment contained in OMM-030, "Control of CV Penetrations During Mid-Loop Operation." If the Reactor Coolant System is to be placed in the Reduced Inventory or Mid-Loop conditions with fuel in the Reactor Vessel, then the OMM-030 requirements and definition of "Closed Containment" apply.

4.2 CLOSE/CLOSING the CONTAINMENT: Establishing or providing the capability to establish at least one barrier to the release of radioactive material between the containment and the outside atmosphere. Barriers selected are to be reasonably capable of remaining in place following a loss of both loops of the Residual Heat Removal (RHR) system. These barriers are to be installed or capable of being installed prior to Reactor Coolant System (RCS) average temperature exceeding 200°F.

- The Containment Personnel air lock doors may be open but at least one of these doors must be capable of being closed.
- The Containment equipment hatch may be removed if the capability is provided to reinstall it with the bolts hand tight prior to exceeding 200°F average RCS temperature following a postulated loss of both RHR loops.
- Devices other than permanent plant equipment may be used to provide Containment Closure. These devices may be constructed of standard materials capable of withstanding 19 psia (approximately 4 psig) in the Containment. These criteria may be justified on the basis of either normal analysis methods or reasonable engineering judgement.

4.3 DEFENSE IN DEPTH: Providing Systems, Structures, and Components to ensure backup of key safety functions using redundant or diverse methods.

4.0 DEFINITIONS (Continued)

4.4 DIVERSE: Providing defense in depth using different systems, structures, and components. An example is providing defense in depth for RCS Makeup with the Chemical and Volume Control System and the Safety Injection System.

4.5 FUNCTIONAL (FUNCTIONALITY): The status of a Shutdown Safety Function System, Structure or Component such that operation of the system or component is possible but automatic features are defeated and non-routine manual actions are required (i.e., use of a temporary system). Shutdown Safety Function equipment need not be seismically operable to be considered functional. An example is defeating EDG automatic start due to the need to manually align a temporary cooling system prior to EDG start.

4.6 HIGHER RISK EVOLUTIONS: Outage Activities, Plant Configurations or conditions during shutdown where the plant is more susceptible to an unanticipated event involving nuclear safety. The following are examples of higher Risk Evolutions:

- Mid-Loop Operations
- Aligning to or restoring from "temporary" Spent Fuel Pit (SFP) cooling methods from the start of used fuel assembly movement from the Core to the SFP until the Core reload is completed and SFP transfer canal gate valve closed.
- Outage activities which cannot be conducted in compliance with the guidelines of Sections 5.1 and 5.2 of this procedure.

4.7 OPERABLE (OPERABILITY): Per H.B. Robinson Steam Electric Plant Operating License and Technical Specifications, Paragraph 1.3.

4.0 DEFINITIONS (Continued)

4.8 REDUNDANT: Providing defense in depth using like systems, structures, and components. An example is providing defense in depth for Fuel Cooling with both trains of the RHR System.

4.9 Shutdown Safety Functions (SSF): These functions are:

- Electrical Power
- Fuel Cooling
- Reactor Coolant System (RCS) and Spent Fuel Pit (SFP) Makeup
- RCS Pressure Control
- Containment Vessel (CV) Integrity/Closure
- Reactor Core and SFP Reactivity Control

These functions are critical to cooling the fuel, controlling reactivity, preventing/controlling unplanned radioactive releases, and successfully mitigating any unplanned events which may occur. Specific Structures, Systems, or Components which could provide SSFs are described in this procedure.

5.0 PROCEDURE

5.1 Management Standards for Outage Scheduling

5.1.1 Overview

The philosophy of the Robinson Nuclear Project Department Management is to protect the health and safety of the general public and employees during all conditions of operation (includes power operation and all shutdown operating conditions). In keeping with this philosophy, every reasonable effort will be made to maintain exposures to radiation as far below the dose limits as is practical, taking into account the state of technology and the economics of improvements in relation to the benefits. Compliance with this procedure and the continuous management oversight and review of the Outage Schedules and activities via outage meeting attendance, field tours, etc., is intended to meet this commitment to public and employee health and safety for outages in which the plant is placed in cold shutdown or refueling.

5.0 PROCEDURE (Continued)

A very important goal for the operation of H. B. Robinson, Unit 2 is the prevention of fuel damaging events during both power operation and while in shutdown. Studies indicate that the probability of events leading to fuel damage during shutdown may be the same order of magnitude as during power operation. Prevention of events while in shutdown reduces the overall risk of plant operation.

Important to the prevention of fuel damage during shutdown periods is maintaining adequate sources of onsite and offsite electrical power and maintaining fuel cooling. Key safety systems must be removed from service on a pre-planned, systematic basis to insure "Defense in Depth" is maintained throughout the shutdown. This will minimize the likelihood of events and provide for mitigation of any events which do occur while shutdown.

The Unit Operators must be fully aware of the status of the Systems, Structures, and Components available to cool the fuel and mitigate events.

An evolution with significant risk is Mid-Loop Operation of the Reactor Coolant System. This evolution involves high risk due to the susceptibility of the Residual Heat Removal (RHR) System pumps to loss due to air entrainment causing cavitation and the short amount of time available to mitigate any loss of cooling. This risk is particularly high early in an outage when decay heat generation is high and lessens gradually as the outage lengthens. Other functions addressed in this procedure that are critical to shutdown safety are the Shutdown Safety Functions (see Definition 4.9).

5.0 PROCEDURE (Continued)

These Guidelines apply to planned outage work activities. The Shift Supervisor has the authority to cause any work activity to occur or cease as he deems necessary to maintain the Unit in a safe condition. (If this occurs, the Shift Supervisor should notify the Shift Outage Manager after taking the action so that the change can be incorporated into the outage schedule.) Unplanned activities resulting from System, Structure, or Component failures or other unanticipated events are to be handled on a case by case basis using normal management processes. Unplanned events may occur during outages which reduce the availability of shutdown safety equipment below that required by this procedure. If this occurs, the immediate corrective action is to place the unit in a safe condition and then restore sufficient equipment to service such that the requirements of this procedure are met.

It is the expectation that deviations from the scheduling requirements of this procedure will not routinely occur. It is recognized that deviations may be necessary due to the nature of certain tasks or prudent for commercial reasons (i.e., substantial cost savings with little or no risk increase). If planned deviations from this procedure are to be used (i.e., Higher Risk Evolutions) to accomplish outage activities, then perform the following:

- Develop written contingency plans to provide adequate shutdown safety via other methods.
- Prior to performing the activity, obtain written approval for the planned deviation and contingency plans via review and approval by the PNSC.
- See Step 5.1.5 of this procedure for additional direction regarding contingency planning.

5.0 PROCEDURE (Continued)

This procedure describes the minimum acceptable standards. Shutdown Safety Function System, Structure, or Component availability in excess of this standard is strongly encouraged.

This procedure is intended to supplement the Unit 2 Technical Specifications by providing additional standards for System, Structure, and Component availability when the unit is in cold shutdown. If this procedure is found to be in conflict with the Unit 2 Technical Specifications, then the requirements of the Technical Specifications take precedent.

5.1.2 Reduced Inventory and Mid-Loop Conditions With Fuel in the Reactor Vessel

The Reduced Inventory Condition exists in the RCS when water level is reduced lower than three (3) feet below the Reactor Vessel Flange (-36 inches).

The Mid-Loop Condition exists when RCS water level is lower than the top of the flow area at the junction of the RCS Hot Leg piping with the Reactor Vessel (-67 inches below the Reactor Vessel Flange).

Six feet (-72 inches) below the Reactor Vessel flange is the lowest RCS water level for which cooling flow via the Residual Heat Removal System can be reliably maintained.

Due to the susceptibility to the loss of fuel cooling (RHR System) and the short amount of time available to mitigate any loss of cooling, **the Reduced Inventory and Mid-Loop Operation conditions are to be avoided whenever possible when fuel is in the Reactor Vessel.**

5.0 PROCEDURE (Continued)

Steam Generator (S/G) Primary Side Inspections (Eddy Current Inspections) and repairs (S/G Tube Plugging), and Reactor Coolant Pump (RCP) seal repairs are examples of evolutions which require Mid-Loop operation or Reduced Inventory operation. If fuel is in the Reactor Vessel, as would be the case during a Mid-Cycle S/G Inspection/ Repair Forced Outage or a refueling outage for which a complete core offload is not planned, the requirements of the following procedures must be established prior to entering the Reduced Inventory and Mid-Loop Conditions:

OMM-030, "Control of CV Penetrations During Mid-Loop Operations"

GP-008, "Draining the Reactor Coolant System", Section 5.3, "Draining the RCS to Mid-Loop"

The requirements of the above procedures are in addition to the Guidelines contained in this procedure and are more conservative. Some of the additional equipment required operable by the above procedures includes CV cooling (1 HVH Containment fan cooler), RCS level and core exit temperature indications, the Plant Computer (ERFIS), additional CV status controls, etc.

If an outage must be conducted utilizing the Mid-Loop or Reduced Inventory conditions, the Outage Schedule is to be organized so that:

- Entry into either condition is delayed as long as practical to reduce the decay heat load.
- Minimal time is spent in either of these conditions.
- Activities potentially impacting RCS level control or RHR Flow Control are suspended while in either of these conditions.

5.0 PROCEDURE (Continued)

5.1.3 Electrical Power Supply

Adequate electrical power must be available during an outage to provide power to the systems providing the core cooling function and the systems in standby which would be used to mitigate any unplanned events. Adequate instrumentation and control power must also be available to allow the Operators to monitor conditions, diagnose events, and control the equipment needed for mitigation.

The following general guidance is to be followed for the scheduling and execution of electrical power supply work during outages:

- **One source of off-site electrical power is to be in service at all times.** (The start up transformer or "Backfeed" via the Unit Auxiliary Transformer)

- **Off-site electrical power is to be provided via the "Backfeed" lineup only when necessary.** The amount of time spent in the "Backfeed" lineup is to be only that necessary for the work requiring the startup transformer to be deenergized. The "Backfeed" lineup may be used at any time while in cold shutdown except that the switching evolutions to enter into or restore from the "Backfeed" lineup are not to be performed during Core Component movements.

- Except as described in this paragraph, **at least one Emergency Diesel Generator (EDG) is to be available or functional throughout the outage.** When fuel is in the Reactor Vessel, one EDG is to be "Available" as defined in this procedure. If the Reactor Vessel has been completely defueled, the one EDG may be "Functional" as defined in this procedure. If Maintenance or Modification activities are necessary that require both EDG's to be out of service simultaneously, this work shall be performed with the Reactor Vessel completely defueled, and the requirements of Steps 5.1.4.2 and 5.2.2.2 for a functional emergency power supply for SFP cooling systems must be provided via another power source(s).

5.0 PROCEDURE (Continued)

- The Dedicated Shutdown Diesel Generator (DSDG) and the necessary electrical buses are to be available as a back-up power source to at least one SFP Cooling Pump from the start of defueling evolution until the Core (Fuel) reload is completed and the Spent Fuel Pit Transfer Canal Gate Valve closed. This will insure the DSDG is available while the SFP could contain a substantial amount of freshly discharged fuel.

- Both Emergency Busses (E-1 and E-2) must be available while both RHR Pumps are required to be available. When one RHR Pump may be removed from service and except as described in this paragraph, at least one Emergency Bus is to be available or functional. This "E" Bus is to be the bus supplied by the available/functional EDG. The status of this "E" Bus (i.e., available or functional) shall match the status of the available or functional EDG. If both "E" Busses must be removed from service simultaneously, the Reactor Vessel shall be completely defueled and the requirements of Step 5.1.4.2 and 5.2.2.2 for a functional emergency power supply for SFP cooling systems must be provided via another power source(s).

- Both trains of the DC Power Supply System must be available while both RHR Pumps are required to be available. When one RHR Pump may be removed from service and except as described in this paragraph, **at least one train of the DC Power System shall be available or functional throughout the outage** to provide instrumentation and control power to systems and components either in service or in standby which are providing the Shutdown Safety Functions. A train consists of the battery, one of two battery chargers for that battery, associated DC Buses, and AC Instruments Buses powered via inverters from the respective DC Buses. This DC Power System Train shall be that train supplying control power to the available/functional EDG. The status of this DC Power System Train (i.e., available or functional) shall match the status of the available or functional EDG. If both trains of the DC Power System must be removed from service simultaneously, the Reactor Vessel shall be completely defueled and the requirements of Step 5.1.4.2 and 5.2.2.2 for a functional emergency power supply for SFP cooling systems must be provided via another power source(s).

- Temporary power may be provided to key components as necessary or desired by an approved process. Two examples are the following Special Process Procedures.

    - SPP-012, "Temporary Power to Battery Charger A-1 or B-1 from MCC-2
    - SPP-014, "Temporary Power to MCC-6 Critical Loads from MCC-2".

5.0 PROCEDURE (Continued)

5.1.4 Additional Shutdown Safety Function Scheduling Policies

5.1.4.1 When fuel is in the Reactor Vessel, the following shutdown safety functions are to have at least the indicated minimum methods available to accomplish the function:

- Electrical Power - Two Methods
- Fuel (Core) Cooling - Two Methods
- RCS Makeup/Boration:
  - a) Refueling Cavity Empty - Two Methods
  - b) Refueling Cavity Full - One Method

The two methods may be **Redundant or Diverse.**

One of the redundant or diverse methods must have an Emergency Power source available. For electrical power, off-site power is the normal power source and the available EDG or the DSDG are the backup power sources.

Robinson, Unit 2, is equipped with two redundant "trains" of "active" safety equipment. Either "train" of "active" equipment is capable of mitigating an event by itself with appropriate Operator action. A scheduling concept which will satisfy many of the constraints described previously in this section is to schedule the outage by "active" safety equipment "trains". Train "A" and Train "B" of "active" shutdown safety equipment are not to be out of service simultaneously (unless the Reactor has been completely defueled). There should then be sufficient "active" equipment available, including a backup electrical power supply, to satisfy the Shutdown Safety Functions utilizing a combination of the Redundant and Diverse Methods. In other words, do not "cross trains" when scheduling out of service periods for Systems, or Components which provide "active" shutdown safety functions.

5.0 PROCEDURE (Continued)

The "passive" components (piping, manual valves, check valves, heat exchangers, etc.) of Robinson, Unit 2, Safety Systems are frequently "common" to both "trains". Therefore, the above requirement to not "cross trains" does not apply to "passive" equipment that is, or may be aligned to be, "common" to both trains of Shutdown Safety Systems.

With fuel in the Reactor Vessel and the Refueling Cavity not full, the RHR system is the only way to provide two methods of fuel cooling unless temporary systems are used. When the Refueling Cavity is full and the Upper Internals removed, the Cavity can be considered a Diverse Method of Core cooling allowing one "train" of RHR components to be removed from service. The Upper Internals must be removed because it could constitute a flow restriction preventing the entry of sufficient refueling cavity water to the Core region if a loss of cooling event occurs.

If the Reactor has been completely defueled, the SFP Transfer Canal Gate Valve closed, and the SFP safety functions satisfied, then the Systems, Structures, and Components that provide Core (RCS) cooling and RCS makeup may be removed from service as necessary for the scope of planned work.

When an emergency power source is not available to one of the Redundant or Diverse methods of satisfying a shutdown safety function as allowed by Step 5:1.3, then the preferred line up is to operate the system or component without the Emergency Power supply and maintain the system or component with the Emergency Power supply in standby.

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CAUTION

When freshly discharged fuel is in the SFP, and if the "normal" SFP cooling power supply is lost, consider entering the Robinson, Unit 2 Emergency Plan based on a loss of offsite power. When temporary SFP cooling systems are used, the Operators must clearly understand what power source is considered "normal".

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5.1.4.2 The following requirements regarding SFP systems apply from just prior to the movement of the first used fuel assembly from the Core to the SFP (start of the defueling evolution) until the Core Reload is completed and SFP Transfer Canal Gate Valve closed.

There shall be two methods (Redundant or Diverse) of providing cooling water to the SFP Heat Exchanger.

If the Redundant method is used for the SFP Cooling Water supply and both methods have the same normal power source (i. e., offsite power), then a functional Emergency Power Supply is required for at least one of the components/train of components.

If the Diverse method is used for the SFP Cooling Water Supply and both methods have different power supplies, then neither Diverse method requires an Emergency Power Supply.

If the Redundant method is two Component Cooling Water (CCW) pumps, then two Service Water (SW) pumps, one with an Emergency Power Supply, one SW Header, and one CCW Heat Exchanger are to be functional.

Both SFP Cooling Pumps shall be available.

5.0 PROCEDURE (Continued)

The DSDG and sufficient electrical buses shall be available with procedures in place for providing backup electrical power to at least one SFP Cooling Pump.

One source of makeup water shall be available to the SFP. An Emergency Power source for this makeup source is not required.

Exceptions to these SFP scheduling requirements are:

- Emergency Bus Undervoltage (UV) relay testing performance during the respective Emergency Bus windows. This testing briefly deenergizes, one at a time, the power supply buses for the SFP Cooling Pumps. This is acceptable because of the procedural controls covering this testing and the short duration of the tests.

- SFP cooling may be restored to the normal systems from temporary systems provided the process can be accomplished well before 150°F SFP temperature is reached, and the procedure controlling the process provides contingency planning for SFP cooling restoration should problems arise. If performed, this evolution is to be considered a Higher Risk Evolution.

5.1.4.3 The remaining Shutdown Safety Functions (RCS Pressure Control, CV Integrity, and Reactivity Control) are managed by Technical Specification and/or Plant Operating Manual (POM) requirements. Specific items are covered in checklist form in Section 5.2 of this procedure.

5.1.4.4 Systems, Structures, or Components that could provide Shutdown Safety Functions are to be returned to service as soon as possible following completion of work.

5.0 PROCEDURE (Continued)

5.1.5 Contingency Planning

5.1.5.1 Contingency Plans are required for Higher Risk Evolutions. The responsibility for developing Contingency Plans is assigned by site management to an appropriate site work group on a case-by-case basis.

5.1.5.2 Depending upon the activity, the following types of information/ guidance may need to be included in the Contingency Plans:

- Use of alternate equipment and/or methods to mitigate unanticipated events.
- Need for additional instrumentation.
- More frequent or continuous monitoring of selected parameters.
- Additional precautions.
- Pre-planned compensatory actions.
- Any other appropriate information/directions.

5.1.5.3 Personnel involved in implementing a Contingency Plan must be familiar with the Plan and their duties. Possible methods to provide this familiarization are:

- Training
- Pre-job briefings
- Other appropriate method or combination of methods.

5.1.5.4 Depending upon the amount of time available to respond, equipment, material, tools, personnel, etc. may need to be pre-staged at the location of the required contingency activity. The need for pre-staging is to be determined on a case-by-case basis as a part of the Contingency Plan development, review, and approval process.

5.1.5.5 Contingency Plans are to be in the form of:

- Special procedures or other procedures controlled per AP-004, "Procedure Control," and AP-022, "Document Change Procedure."
- Part of an approved Modification, Temporary Modification, or Engineering Evaluation.
- Provided in writing to, and reviewed and approved by the PNSC.
- Some combination of the above.

5.1.5.6 Higher Risk Evolutions and the required Contingency Plan are to be reviewed and approved by the PNSC prior to conducting the evolution. For Higher Risk Evolutions identified pre-outage, a possible opportunity to conduct this review is during the required PNSC review of the outage scheduling logic and Independent Outage Risk Assessment results (see Step 5.3.4 of this procedure).

5.1.5.7 Higher Risk Evolutions identified after the Independent Outage Risk Assessment are to be processed per Step 5.4.2.7 of this procedure.

5.1.6 Containment Closure

5.1.6.1 To comply with reference 2.1 regarding Containment Closure, a fifth possible Containment (CV) condition (Containment Closure) has been created. The five possible conditions are:

- CV Integrity (per Technical Specifications)
- Refueling Integrity (per Technical Specifications)
- Reduced Inventory/Mid-Loop Operations CV Closure (NRC Generic Letter 88-17 Compliance). See OMM-030, "Control of CV Penetrations During Mid-Loop Operations"
- CV Closure (Ref. 2.1 Compliance)
- CV Open (No restrictions).

The CV is to be considered in only one of the above conditions at a time.

5.0 PROCEDURE (Continued)

5.1.6.2 CV Closure is required when:

- Fuel is in the reactor vessel.
- The Refueling Cavity is not full (less than 23 feet of water above the Reactor Vessel Flange).
- The upper internals are not removed.
- CV Status is not being controlled by other requirements (CV Integrity, Refueling Integrity, or OMM-030).

5.1.6.3 CV Closure is not required when:

- there is no fuel in the CV,

  \- OR -

- the Refueling Cavity is full, upper internals are removed, and core components are not being moved.

5.1.6.4 When Containment Closure is required, compliance with reference 2.1 will be assured by compliance with Technical Specification paragraph 3.3.1.4.b. This paragraph requires that all Containment penetrations providing direct access from the Containment atmosphere to the outside atmosphere be closed prior to Reactor Coolant System average temperature exceeding 200°F. The following provides guidance for meeting this action statement if necessary. The fundamental goal is to prevent fuel damage.

1. The Containment equipment hatch is not to be removed until the decay heat level and Reactor Coolant Temperature are reduced such that the RCS "Feed and Bleed" core cooling method is capable of maintaining RCS average temperature less than 200°F.
   - Initial RCS temperature for equipment hatch removal will be less than or equal to 140°F. From this initial temperature or less, One SI pump and one Charging Pump injecting into the cold legs and started within 10 minutes of a complete loss of RHR will insure average RCS temperature remains less than 200°F.

- For steady state operation at 100% power prior to the outage, the equipment hatch is to remain in place for at least 96 hours after the unit is off line.
- For operation at power levels less than 100% prior to the outage, the Nuclear Fuels Section may be contacted to determine if a waiting period shorter than 96 hours following unit off line is acceptable. If acceptable based on actual decay heat levels, the equipment hatch may be removed sooner.
- Reference 2.8 documents the acceptability of the "Feed and Bleed" core cooling method based on the above initial conditions.

2. The "Feed and Bleed" core cooling method is one SI pump injecting into the RCS cold legs at full flow, **AND** one charging pump injecting into the RCS cold legs and Reactor Coolant Pump (RCP) seals at full flow. If seal injection flow to the RCPs is not needed (RCPs shutdown and RCS depressurized) all the flow from one charging pump may be direct to the cold leg path. The "Bleed" path is out through at least one open pressurize Power Operated Relief Valve (PORV) to the Pressurizer Relief Tank (PRT) and eventually to the Containment atmosphere via a PRT rupture disk. (It is preferable to have both Pressurizer PORVs open if this cooling method must be used.)

3. While the equipment hatch is removed, continuously provide the ability to reinstall it within four hours of a postulated loss of both RHR loops. These provisions should consider, but not be limited to, the following:
   - The availability of a crane, rigging, and crane operators capable of lifting the equipment hatch.
   - Removal of any interferences (i.e., skid beam).
   - Necessary miscellaneous tools and equipment.
   - A lead man capable of being contacted by Operations personnel and support personnel as necessary.

- Recognition that the RCS "Feed and Bleed" core cooling method will be in progress with pre-arranged agreements with the Health Physics staff to conduct this task as an emergency activity.

4. Reinstall the equipment hatch prior to performing any of the following:
   - Removing the cold leg Safety Injection header from service.
   - Removing the Charging System cold leg injection flow path from service.
   - Degrading the reactor coolant loop pressure boundary such that a flow path is created that would cause any additional amount of injected flow to bypass the core region. (Disassembling the Reactor Vessel Head is acceptable because any openings on the Vessel Head will cause the injected water to flow to the core.)
5. Once the Containment is "Closed", or the Equipment hatch is installed and any other open penetrations are capable of being "Closed" prior to RCS average temperature exceeding 200°F, then there are two other acceptable decay heat removal methods should a loss of both RHR loops occur. At least one of these two other methods is to be available in addition to the "Feed and Bleed" method when Containment Closure control is required. These methods are:
   - Establish natural circulation cooling if the RCS is intact,

     <u>OR</u>

   - Reduce the makeup (injected) flow rate (or establish sufficient makeup flow) to provide boiling decay heat removal ("Feed and Boil"). This will conserve Refueling Water Storage Tank inventory to allow additional time to recover RHR.
6. When natural circulation is credited, schedule the availability of the following as indicated:
   - One Steam Generator (S/G) and associated S/G PORV.

- The Condensate Storage Tank (CST)
- One Motor Driven Auxiliary Feedwater Pump (MDAFW) with an emergency power supply and associated valves and piping from the CST to the available S/G.
- If possible based on outage work scope, the capability to energize one bank of Pressurizer heaters.

NOTE

The capacity of one Charging Pump is sufficient to remove decay heat via "Feed and Boil" within 48 hours after unit shutdown. This assumes that all of the flow reaches the core region. Due to the possibility of bypass flow due to openings in the RCS created by planned work, one SI pump is also provided.

7. When "Feed and Boil" is credited, schedule the availability of the following:
   - One SI Pump, with an emergency power supply, aligned to either the cold leg or hot leg Safety Injection Header.
   - One Charging Pump, with an emergency power supply, aligned to either the cold leg or hot leg Charging System flow path. RCP seal injection may also be provided if necessary.
   - A flow path from the RCS to the containment atmosphere of sufficient capacity to vent the steam created by boiling in the core. An opening equal to or greater than the size opening created by one open Pressurizer PORV is required.
8. When Containment Closure is required, provide containment pressure control with one available Containment Fan Cooler (HVH) unit and one available Service Water Booster Pump (SWBP). Each of these components is to have an emergency power supply.
9. The following devices, equipment, and components need not be seismically qualified to provide for Containment closure.
   - Devices, tools, and equipment, used to establish closure.
   - Components associated with the "Feed and Bleed" core cooling method.
   - Components associated with the "natural circulation" core cooling method.
   - Components associated with the "feed and boil" core cooling method.

- The HVH unit and SWBP providing Containment pressure control. The SWBP may need to be seismically operable to support the requirement elsewhere in this procedure that the Service Water system be seismically operable to support the normal core cooling method (RHR).

5.1.7 Returning Equipment to Service

Systems and components which are being returned to service and which are to be credited with providing a Shutdown Safety Function are to be placed in a status commensurate with the requirements of Section 5.2 and Definitions 4.1, 4.5, and 4.7 (available, functional, and operable).

The plant conditions which exist during outages may prevent (based on test Prerequisites) the performance of surveillance testing and other post maintenance testing performed to declare a system or component "operable". "Operability" testing for these components or systems is conducted as the correct plant conditions are established during the start-up process. The following guidance is provided for establishing the "availability" or "functionality" of systems or components being returned to service during outages to satisfy Shutdown Safety Functions.

1. Partial system lineups should be completed for the portions of the systems necessary to accomplish the Shutdown Safety Function, or ensure that the system or component status had been adequately controlled while out of service by other administrative controls (i.e., the OMM-004, Operations Work Procedure, Process).
2. Perform the post maintenance testing permitted by the compatibility of the existing plant conditions with the prerequisites of the applicable testing procedures.
3. Key system or component parameters (flow, pressure, temperature, etc.) may be monitored as the system or component is placed in service. This is not intended to be a rigorous comparison of "as found" data to "historical" data. Rather, judgement and experience should be used to establish reasonable confidence that the system or component can perform its Shutdown Safety Function.

Note

Paragraph 5.1.7.4 following is not applicable when the system or component is only required to be functional.

4. For those systems required to be seismically operable to be considered "available" (see Definition 4.1), no condition will exist which violates the seismic qualification of the available flow path or components. Any temporary condition that exists must be evaluated as acceptable per an appropriate engineering process. The following are examples of temporary conditions possibly impacting seismic operability (see also MMM-001, Step 5.5.14):
   - Sections of pipe or other components physically removed or disconnected from the system (i.e., valve bodies unbolted from or cut out of the system, pump suction or discharge flanges unbolted, etc.).
   - Piping or component supports/hangers disconnected or removed.
   - Temporary piping systems installed that have not previously been evaluated.
5. Operations Management is responsible for providing any detailed guidance needed on a system by system, component by component basis to support the "available" and "functional" status decision making process. Consultation and input from other work groups such as Systems Engineering may be obtained as considered necessary.

5.1.8 Shutdown Safety Function Status

Shutdown Safety Function Status is to be communicated regularly to outage personnel. This is to include a description of any Higher Risk Evolutions in progress. See Reference 2.5 for the details of this process.

5.0 PROCEDURE (Continued)

5.1.9 Nuclear Safety Performance Critique

Upon outage completion, a nuclear safety performance critique is to be performed. This critique will compare actual nuclear safety performance versus the requirements of this procedure. See also Reference 2.5.

5.1.10 Training

5.1.10.1 The Manager - Outage Management is responsible for initiating outage related training for the following topics. This training is applicable to planned outages during which Unit 2 is placed in cold shutdown or refueling.

1. Outage related training for Operations personnel to include an overview of the outage schedule, a review of the Risk Management Scheduling Guidelines, and a discussion of any Higher Risk Evolutions, including associated contingency plans, included in the outage scope. Other outage related topics may be included as necessary.
2. An overview of outage risk management concepts for other company and contractor personnel who will be involved in the outage.

5.1.10.2 Operations and Training Unit Management should be contacted to determine if any training is required regarding mitigating procedures for events occurring while shutdown. This may involve procedure revisions or simply refresher training as necessary.

5.0 PROCEDURE (Continued)

****

CAUTION

Some of the systems described in Section 5.2 are required to be operable seismically to be considered "available". See Definition 4.1, "Available (Availability)," for a list of these systems.

****

5.2 Outage Schedule Development/Review Checklist

5.2.1 Electrical Power

5.2.1.1 Off-site Electrical Power

1. One source in service throughout the outage.
2. "Backfeed" off-site electrical power source scheduled for use only when necessary and the duration it is used is only as long as required for the work scope.
3. Off-site power source line up changes scheduled when core components are **NOT** being moved.

NOTE

Testing of the EDG to remain available/functional should be considered prior to removing the other EDG from service. Routine/daily testing of the available/functional EDG is not required when the other EDG is out of service (Ref. 2.6).

5.2.1.2 Emergency Diesel Generators

1. Fuel in Reactor Vessel:
   One EDG available
2. Reactor Vessel Completely Defueled:
   One EDG functional unless planned work activities are verified to be such that both EDG's must be out of service and the requirements of Step 5.2.2.2 for a functional emergency power supply for SFP cooling systems are provided via another power source(s). The amount of time that at least one EDG is not available or functional shall be only as long as required to accomplish the work.

5.0 PROCEDURE (Continued)

5.2.1.3 Emergency (E) Buses

1. Fuel in Reactor Vessel, Refueling Cavity not flooded and Upper Internals not removed (both RHR Pumps required available): Both E Buses available
2. Fuel in Reactor Vessel, Refueling Cavity flooded and Upper Internals removed:
   The E Bus associated with the available EDG shall be available.
3. Reactor Vessel Completely Defueled:
   The E Bus associated with the functional EDG shall be functional unless planned work activities are verified to be such that both E Buses must be out of service, and the requirements of Step 5.2.2.2 for a functional emergency power supply for SFP cooling systems are provided via another power source(s). The amount of time that at least one E Bus is not available or functional shall be only as long as required to accomplish the work.

5.2.1.4 DC Power Trains

1. Fuel in Reactor Vessel, Refueling Cavity not flooded and Upper Internals not removed (both RHR Pumps required available): Both DC Power trains available.
2. Fuel in Reactor Vessel, Refueling Cavity flooded and Upper Internals removed:
   The DC power train associated with the available EDG shall be available.
3. Reactor Vessel Completely Defueled:
   The DC Power Train associated with the functional EDG shall be functional unless planned work activities are verified to be such that both (or portions of both) DC Power Trains must be out of service, and the requirements of Step 5.2.2.2 for a functional emergency power supply for SFP cooling systems are provided via another power source(s). The amount of time that at least one DC Power Train is not available or functional shall be only as long as required to accomplish the work.

5.0 PROCEDURE (Continued)

5.2.1.5 Dedicated Shutdown Diesel Generator (DSDG)

From the start of the defueling evolution until the Core (Fuel) Reload is complete and SFP Transfer Canal Gate Valve closed.

- DSDG Available
- Sufficient Electrical Buses Available
- Procedures in place to provide backup power to at least one SFP Cooling Pump.

5.2.2 Fuel Cooling

5.2.2.1 Fuel in Reactor Vessel

1. Two of the following options operable
   - "A" RHR Train
   - "B" RHR Train
   - Refueling Cavity Filled to the Refueling Water Level and Upper Internals removed
2. Support Systems Available (Minimum)
   - 2 SW Pumps, One with an Emergency Power Supply
   - 1 SW Header
   - 1 CCW Heat Exchanger
   - Refueling Cavity Empty - 2 CCW Pumps with one having an available Emergency Power Supply
   - Refueling Cavity Full and Upper Internals removed - 1 CCW Pump with an available Emergency Power Supply
3. The corresponding CV Sump recirculation flow path is to be available whenever the corresponding RHR Train is required to be operable.
4. Verify Plant Procedures control RCS/Refueling Cavity temperatures as required for fuel movement (Technical Specification 3.8.1.e)

5.0 PROCEDURE (Continued)

NOTE

See Step 5.1.4.2 for allowed exceptions to the following SFP scheduling requirements.

5.2.2.2 SFP from the start of the Defueling Evolution until the Core (Fuel) Reload is complete and SFP Transfer Canal Gate Valve closed.

1. Two methods functional to provide cooling water to the SFP Heat Exchanger.
2. Two SFP Cooling Pumps available.
3. Control Room SFP Temperature Annunciation functional or an approved backup method established to monitor SFP temperature.
4. If the Redundant method is used for the SFP Cooling Water supply (i.e., CCW) and both methods have the same normal power source (i.e. offsite power), then a functional Emergency Power supply is required for at least one train of the components.
5. If the Diverse method is used for the SFP Cooling Water Supply and both methods have different power supplies, then neither Diverse method requires an Emergency Power Supply.
6. If the Redundant method chosen is two CCW Pumps, then the following minimum support systems are required.
   - 2 SW Pumps, one with a functional Emergency Power Supply
   - 1 SW Header
   - 1 CCW Heat Exchanger
7. Verify Plant Procedures control the SFP temperature while moving fuel from the Reactor Vessel to the SFP (Technical Specification 3.8.3)
8. The Firewater System should be available during this time period.

5.2.3 Makeup Capability

5.2.3.1 RCS Makeup - Fuel in Reactor Vessel and Refueling Cavity empty:

1. Two sources of Borated Makeup available.
2. Two separate delivery (flow) paths available.
3. One Borated Makeup source and delivery flow path components must have normal and emergency electrical power sources available.
4. The second Borated Makeup source and delivery flow path components may have only one power source available.

5.0 PROCEDURE (Continued)

5.2.3.2 RCS Makeup - Fuel in Reactor Vessel and Refueling Cavity Full:

a. One source of Borated Makeup available.

b. One delivery (flow) path available.

c. A normal and Emergency Power Source shall be available to the source of Boric Acid and the delivery components.

5.2.3.3 SFP Makeup - One SFP Makeup source is required at all times. An Emergency Power supply for this source is not required.

5.2.4 RCS Pressure Control

5.2.4.1 Technical Specification (T.S.) 3.1.1.3.a

- Verify that the Outage Schedule and Plant Procedures ensure that one Pressurizer Code Safety is operable when the Reactor Vessel Head is installed and the RCS is not open for maintenance.

5.2.4.2 T.S. 3.1.2.1.d

- Verify the Outage Schedule and Plant Procedures ensure that the Low Temperature Overpressure Protection (LTOPP) System is scheduled to be placed in service when necessary (RCS temperature less than 350°F and the RCS not vented).
- Verify that Plant Procedures define, establish, and control an adequate RCS Vent Path prior to removing the LTOPP System from service.

5.2.4.3 Verify that the Outage Schedule or Plant Procedures ensure the Safety Injection accumulators will be removed/restored to service per Technical Specification 3.3.1.1.g and 3.3.1.3 to prevent RCS Overpressurization.

5.2.4.4 Verify that the Outage Schedule or Plant Procedures remove/restore the Safety Injection Pumps from service per Technical Specification 3.3.1.3 to prevent RCS Overpressurization.

5.0 PROCEDURE (Continued)

5.2.5 Containment Vessel (CV) Integrity

5.2.5.1 Verify the Outage Schedule ensures CV Integrity is established as required for operation greater than 200°F. (T.S. 3.6.1)

5.2.5.2 Verify the Outage Schedule ensures Refueling CV Integrity is established prior to and during Refueling Operations per GP-010, "Refueling."

5.2.5.3 If Reduced Inventory or Mid-Loop Conditions are scheduled, verify that Reduced Inventory/Mid-Loop Operation CV Closure and other special requirements are established prior to and during operation in these conditions per the following Plant Procedures.

- OMM-030, "Control of CV Penetrations During Mid-Loop Operations"
- Section 5.5 of GP-008, "Draining the Reactor Coolant System"

5.2.5.4 Verify that CV Closure will be controlled, when necessary, per Step 5.1.6 of this procedure.

5.2.6 Reactor Core and SFP Reactivity Control

5.2.6.1 Verify that the Outage Schedule and/or Plant Procedures ensure the following shutdown margin requirements are met.

- T.S. 3.1.1.1.a - When less than 2% power and one or less RCP is operating, one of the following is required: 4% shutdown margin, open Lift Coil Disconnects for all rods not fully withdrawn, or open the Reactor Trip Breakers.
- T.S. 3.6.1.b - CV Integrity shall not be violated with the Reactor Vessel Head removed unless a shutdown margin greater than 6% is constantly maintained.
- T.S. 3.10.8.2 - Cold shutdown required Shutdown margin (1%)
- T.S. 3.10.8.3 - Refueling shutdown required Shutdown margin (6%).
- T.S. 5.4.3 - Spent Fuel Pit Boron Concentration (1500 PPM)

5.0 PROCEDURE (Continued)

5.2.6.2 Verify that the Outage Schedule and/or Plant Procedures ensure that the requirements of T.S. 3.8, "Refueling", are met prior to and during Refueling Operations per GP-010, "Refueling." This specification includes many requirements intended to insure nuclear safety during Refueling Operations. Some examples are Source Range Nuclear Instruments, CV and SFP Ventilation System requirements, Radiation Monitor Operability, etc.

5.2.6.3 Verify that Plant Procedures control such things as:

- Fuel handling organization including the individual responsible for fuel movements.
- Personnel Qualification
- Monitoring Shutdown Margin (1/M Plots) during the Fuel Assembly Reload.
- Verifies the fuel in the Core is "Coupled" to the Source Range Nuclear Instrumentation.
- Establishes controls as necessary for fuel assemblies stored temporarily in Core locations other than the final locations.
- Fuel handling equipment checkout prior to use in both the CV and SFP.
- Procedures exists for mitigating Boron Dilution Events
- Procedures/Guidance exist to ensure RCS temperature is maintained above the minimum temperature used for the shutdown margin calculation.

5.2.6.4 Verify that Procedures and policies exist for conducting post Core Reload Control Rod testing, Startup (Low Power) Physics testing, and power ascension testing. Verify that these tests will be conducted by qualified personnel, with sufficient access to and oversight by management personnel with the authority to resolve any issues which may arise.

5.2.7 Miscellaneous Reviews

5.2.7.1 Verify that Contingency Planning is in place or is being developed for outage activities identified as Higher Risk Evolutions.

5.2.7.2 Review the Outage Schedule for any activities or combination of activities that could present a high risk of challenging any of the six Shutdown Safety Functions (Higher Risk Evolutions). Consideration should also be given to identifying Higher Risk Evolutions based on the following:

- The potential introduction of hazards (i.e., fire, flooding, etc.) posed by the level and/or scope of activities in a given area. Identify possible compensatory measures if necessary.
- Any potential plant configurations where a single active failure or personnel error could result in a rapid RCS inventory loss.

5.2.7.3 Review the following for adequacy regarding transformer and switchyard work controls:

- Policies and/or interface agreements for controlling work on transformers and in the switchyard.
- Use of precautions (i.e., signs, barriers, pre-job briefings, etc.) when working in these areas.
- Use of periodic management/safety inspections of these work areas for developing hazards or improper work practices.
- Use of the switchyard/transformer area as a storage/laydown area should be strictly controlled and allowed only if there are no viable alternatives. Any allowed storage/staging should be well away from energized equipment.
- Verify that maintenance activities on power lines and transformers which provide sole offsite power to Unit 2 are avoided during Higher Risk Evolutions.

5.2.7.4 Verify that procedures are in place for mitigating unplanned events while shutdown (see Reference 2.1). Some examples are, but not limited to:

- Containment status controls
- Loss of decay heat removal
- Loss of SFP cooling
- Loss of coolant
- Loss of electrical power
- Cavity seal failure
- Boron Dilution

5.2.7.5 Verify that outage interval and routine surveillance testing for shutdown safety function equipment is scheduled appropriately to insure operability, availability, or functionality when required (Ref. 2.6).

5.3 Independent Outage Risk Assessment Process

Before final approval of the Outage Schedule, a review of the schedule from a risk reduction/management perspective involving independent, knowledgeable personnel provides added assurance that the outage can be conducted with minimal risk. This review would focus on maintaining adequate defense in depth, commensurate with plant conditions during the outage. Sections 5.1 and 5.2 of this procedure are the technical guidance for conducting this review. The following guidelines assign responsibilities and describe the administrative process for accomplishing this review.

1. The RNPD "Manager - Outage Management" is responsible for organizing a pre-outage Independent Outage Risk Assessment of each planned outage during which Unit 2 is placed in cold shutdown. Schedules developed for forced outages during which Unit 2 is placed in cold shutdown are to be reviewed as soon as reasonably possible. This includes the identification of a Review Team Leader. At least half of the personnel on the Risk Assessment Team must have not been directly involved in the development of the outage plan and schedule which is to be reviewed. One of these persons must hold or have held a Senior Reactor Operator License for H. B. Robinson, Unit 2.

2. The timing of the Review should be coordinated so that there is a high confidence in the accuracy of the Outage Schedule yet sufficient time remaining prior to the start of the outage to allow the Review Team to prepare a report and for response to the Review Team recommendations.

3. The Review Team Leader is responsible for managing the efforts of the team members during the review and conducting an exit meeting with "Manager - Outage Management" or his designee. The Team Leader will clearly identify any recommendations resulting from the review and, if possible, deliver a draft written report at the exit meeting. The Team Leader is also responsible for delivery of the final written report. The Team Leader may request, if desired, a written response to any or all of the Review Team's recommendations.

4. The "Manager - Outage Management" shall arrange for the Plant Nuclear Safety Committee (PNSC) to review the results of the Independent Outage Risk Assessment and to review the High Level Scheduling logic for the outage prior to the outage start. Contingency Plans for known Higher Risk Evolutions may also be presented for concurrent review, but if not done with the Schedule review, must be reviewed by the PNSC prior to the evolution.

5. The "Manager - Outage Management" shall ensure that the Review Team's recommendations are placed on the Refueling Outage Action Item List (which is part of the computerized Site Work Tracking System), have responsible individuals assigned, and completion dates assigned appropriate to the significance and priority of each recommendation.

5.0 PROCEDURE (Continued)

6. If the Review Team Leader has requested a written response, the "Manager - Outage Management" is responsible for negotiating a response date with the Team Leader and preparing and submitting the response as negotiated.

NOTE

The Outage Schedule Change Risk Review Process does not replace the "Outage Management Manual," "Administrative Guidelines and Procedures (AG&P), 7-02, Outage Scope Addition Process. The Scope Addition process is primarily intended to help manage the commercial aspects of adding work to an outage. The Schedule Change Risk Review Process is provided to manage the nuclear safety impact of added work.

5.4 Outage Schedule Change Risk Review Process

NOTE

The technical and economic basis for an outage schedule change is evaluated by the Outage Scope Addition process and/or by Step 5.4.3.3 of this procedure.

5.4.1 Outage Schedule Changes which occur after the pre-outage Independent Outage Risk Assessment (See Section 5.3) shall be reviewed for impact on outage risk. The following are examples of Outage Schedule changes:

NOTE

Changing the exact start/stop times of existing outage activities within the constraints of the currently assigned "Work Window" does not constitute an Outage Schedule Change.

1. Outage Scope Additions (See AG&P 7-02)
2. Additional work (modifications, Work Requests, etc.) caused by the results of planned inspections, tests, corrective/ preventative maintenance, etc.

5.0 PROCEDURE (Continued)

3. Moving outage activities (Work Requests, Modification activities, etc.) from one "Work Window" to another.
4. Adding, changing, or deleting scheduling "logic" ties between individual "system/work windows" and between "system/work windows" and the "generic backbone" of the schedule.

5.4.2 The Outage Schedule Change Risk Review Process is as follows:

5.4.2.1 The Lead Evaluator is responsible for initiating the review of schedule changes. The Lead Evaluator is one of the following:

- Manager - Outage Management or his designee
- Shift Outage Manager

5.4.2.2 The review is initiated by the Lead Evaluator calling a Schedule Change Risk Review Meeting. The following work groups are to be represented by appropriate management or outage coordination personnel.

- Outage Management
- Operations
- Maintenance
- Systems Engineering

5.4.2.3 The frequency of the Schedule Change Risk Review Meetings is as follows:

- Pre-outage (but after the Independent Risk Assessment): Frequency to be determined by the Lead Evaluator on an as needed basis.
- During the outage: daily, or more frequently as necessary to support and maintain the outage schedule.

5.4.2.4 Schedule Changes/Additions are submitted to the Lead Evaluator by the Outage Planners in a format that provides for recording at least the following information. Additional information may be included as desired.

5.0 PROCEDURE (Continued)

1. Identification of activity/task being assessed (i.e., Work Request number, modification number, surveillance test number, noun name, or other identifier).
2. System/Component identification
3. Current activity "work" window
4. Proposed activity "work" window
5. Reason for change/addition
6. Space for documentation of the review results. The possible results of the review are:
   - Screening Criteria satisfied and change approved
   - Screening Criteria not satisfied, further review required.
7. Lead Evaluator signature and date.

NOTE

During an outage, the Shift Outage Manager can preliminarily approve, with Shift Supervisor concurrence, schedule changes/additions necessary to prevent the outage from lengthening if the screening criteria of Step 5.4.2.5 are met. The changes/additions are to be reviewed at the next Schedule Change Risk Review Meeting.

5.4.2.5 The following Screening Criteria are used to identify Schedule Changes/Additions that do not impact outage risk.

1. If the Change/Addition can be performed in an existing "work window," then approve the change and go to Step 5.4.3. If not, then proceed to the next step.

2. If the Change/Addition affects one or more of the six (6) Shutdown Safety Functions or the Miscellaneous Issues described in Step 5.2.7, then go to the next step. If not, then approve the change and go to Step 5.4.3.

NOTE

The Manager - Outage Management may choose to present the results of the Schedule Change Risk Review Process to the PNSC even if all criteria are met. This is intended to function as a "spot check" of the process and should occur "after the fact" during a regularly scheduled PNSC meeting. This decision is documented on Attachment 6.1.

5.4.2.6 The following steps are used to assess Schedule Changes/Additions that affect one or more of the six (6) Shutdown Safety Functions or the Miscellaneous Issues described in Step 5.2.7.

1. During the Schedule Change Risk Review Meeting, review the proposed Schedule Change/Addition using the criteria of Section 5.2 of this procedure.
2. Document this review using Attachment 6.1.
3. If all the criteria of Section 5.2 are met, then the change is approved per Attachment 6.1 and go to Step 5.4.3. If not, then proceed to the next step.

5.4.2.7 The following steps are used to assess Schedule Changes/Additions that do not meet the criteria of Section 5.2 of this procedure:

1. Site Management delegates to an appropriate site organization the responsibilities for developing Contingency Plans and preparing a presentation to the PNSC. The PNSC presentation is to demonstrate how the proposed schedule change/addition and supporting Contingency Planning insure adequate shutdown safety.
2. The Contingency Plans are to be as follows:
   - A special procedure or other procedure controlled per AP-004, "Procedure Control," and AP-022, "Document Change Procedure".
   - Part of an approved Modification, Temporary Modification, or Engineering Evaluation.
   - Provided in writing to, and reviewed and approved by the PNSC using Attachment 6.1.
   - Some combination of the above.

3. Document the PNSC review of the Schedule Change/Addition including the Contingency Plan using Attachment 6.1.
4. If the PNSC approves the Change/Addition and the required Contingency Plans, then go to the next step. If not, then do not make the change and do not do the work associated with the change.

5.4.3 The following steps are taken once an Outage Schedule Change/Addition is approved:

5.4.3.1 The Lead Evaluator forwards the approved changes to the Outage Planners/Schedulers.

5.4.3.2 The Outage Planners/Schedulers revise the Outage Schedule as approved. This could involve:

- moving work to different "work windows."
- creating new "work windows."
- logic "tie" changes as approved.

NOTE

The purpose of notifying management of outage duration changes is to allow appropriate action to be taken to manage the commercial impact of the changes.

5.4.3.3 The Outage Planners/Schedulers analyze the impact of the changes on the overall Outage Schedule. If the outage duration is changed, notify the Shift Outage Manager or Manager - Outage Management. The Manager notified will initiate appropriate action to manage the improvement in the schedule, or initiate efforts to recover any schedule slippages. If the outage duration is not affected, no action other than normal processing of the schedule is required.

5.0 PROCEDURE (Continued)

5.5 Disposition of Records

5.5.1 Outage Schedule Change/Addition Screening Forms (See Step 5.4.2.4): The Manager - Outage Management retains these forms until the post outage critiques are completed. These forms may then be discarded.

5.5.2 Attachment 6.1, PNSC review not required: The Manager - Outage Management retains these records until the post outage critiques are completed. These records may then be discarded.

5.5.3 Attachment 6.1, PNSC review required: A copy of this record is maintained as part of the applicable PNSC meeting minutes.

6.0 ATTACHMENTS

6.1 Assessment of Safety Significant Schedule Changes/Additions

ASSESSMENT OF SAFETY SIGNIFICANT SCHEDULE CHANGES/ADDITIONS

1.0 Describe the Schedule Change/Addition being assessed. Include sufficient information so that the impact on the overall status of the Shutdown Safety Functions can be assessed. Marked-up Outage Schedules may be used to help clarify/visualize the change. Attach additional sheets as necessary.

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2.0 Describe the reason for the change. Attach additional sheets as necessary.

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3.0 <u>Assessment Process</u>

3.1 If all criteria are met (<u>yes</u> answers to 4.1 through 4.7 following), the schedule Change/Addition is approved by the Lead Evaluator with concurrence signatures by the Schedule Change Risk Review Meeting attendees. See Step 5.0 of this Attachment to document the assessment results. The approved "work window" identification and "logic ties" are to be recorded in the space provided (Step 5.3). The Manager - Outage Management may choose to present schedule changes for which all criteria were met at a subsequent regularly scheduled PNSC meeting. This is intended as a periodic "spot" check of the process.

ASSESSMENT OF SAFETY SIGNIFICANT SCHEDULE CHANGES/ADDITIONS

3.0 Assessment Process (Continued)

3.2 If any criteria is not met (a no answer to one or more of 4.1 through 4.7 following), the Schedule Change/Addition is forwarded to the appropriate Work Group for Contingency Plan development and presentation to the PNSC for approval. See Step 5.0 of this attachment to document the assessment results. The recommended "work window" identification and "logic ties" are to be recorded in the space provided (Step 5.3). Step 6.0 of this attachment is for the Contingency Planning and PNSC review/approval process.

4.0 Assessment of compliance with criteria of Section 5.2.

	CRITERIA		CRITERIA MET (YES)	CRITERIA MET (NO)
4.1	Electrical Power	(5.2.1)	☐	☐
4.2	Fuel Cooling	(5.2.2)		
4.2.1	RCS Cooling	(5.2.2.1)	☐	☐
4.2.2	SFP Cooling	(5.2.2.2)	☐	☐
4.3	Makeup Capability	(5.2.3)		
4.3.1	RCS Makeup	(5.2.3.1 or 5.2.3.2)	☐	☐
4.3.2	SFP Makeup	(5.2.3.3)	☐	☐
4.4	RCS Pressure Control	(5.2.4)	☐	☐
4.5	Containment Vessel Integrity	(5.2.5)	☐	☐
4.6	Reactor Core and SFP – Reactivity Control	(5.2.6)	☐	☐
4.7	Miscellaneous Reviews	(5.2.7)	☐	☐

ASSESSMENT OF SAFETY SIGNIFICANT
SCHEDULE CHANGES/ADDITIONS

5.0 Assessment Dispositioning

5.1 All criteria met, Change/Addition approved ☐

- OR -

5.2 One or more criteria not met, process per Step 6.0 ☐

5.3 Describe the new approved/recommended (circle one) "work window" and scheduling "logic ties" here. Attach additional pages as necessary.

____

____

5.4 Schedule Change Risk Review Meeting Attendees Signatures

Lead Evaluator : ________________ Date ______________

Meeting Attendees:

Operations ________________ Date ______________

Maintenance ________________ Date ______________

Systems Eng. ________________ Date ______________

5.5 To be reviewed during a regular PNSC meeting: Yes ☐ No ☐

Manager - Outage Management ________________ Date ________

NOTE:

Step 6.0 is not applicable if all criteria are met.

6.0 Contingency Planning and PNSC Review

6.1 Document or attach Contingency Plans and/or reference Contingency Planning documents. Attach additional pages as necessary.

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6.2 PNSC Review Results

Change/Addition approved ☐ Not approved ☐

PNSC Chairman ________________ Date ______________

Outage Risk Management Process

Robinson Procedure

PLP-055, "Outage Risk Management"

References

NUMARC 91-06, "Guidelines For Industry Action To Assess Shutdown Management"

INPO 92-005, "Guidelines For The Management Of Planned Outages At Nuclear Power Stations"

PLP-055 Organizational Structure

Management Standards For Outage Scheduling

- Definitions
- Overview
- Reduced Inventory & Mid-Loop
- Electrical Power Supply Policies
- Other Shutdown Safety Function Policies
- Contingency Planning
- Containment Closure
- Returning Equipment To Service
- Shutdown Safety Function Status
- Nuclear Safety Performance Critique
- Training

Outage Schedule Development/Review Checklist

- Electrical Power
- Fuel Cooling
- Makeup Capability
- RCS Pressure Control
- Containment Vessel Integrity
- Reactor Core & SFP Reactivity Control
- Miscellaneous Reviews

Independent Outage Risk Assessment Process

Outage Schedule Change Risk Review Process

Outage Duration

Critical Path Summary

Shutdown, Cooldown, RCS Purification

Reactor Head Disassembly, Core Offload

Maintenance, PMs, Cavity Reflood, Polar Crane

Core Reload And Reactor Head Reassembly

Startup, Testing, Unit On-Line

1993 RO-15 Major Modifications

MOD-1113	Containment Service Water Penetrations
MOD-1074	Electrical Penetrations Replacement Phase II
MOD-1133	Replace Unit 230kv Generator Breakers
MOD-1143	Polar Crane Refurbishment
MOD-1104	RNP Piping Improvement Plan
MOD-1144	Safety Related Components Anchor Bolting Operability Issue

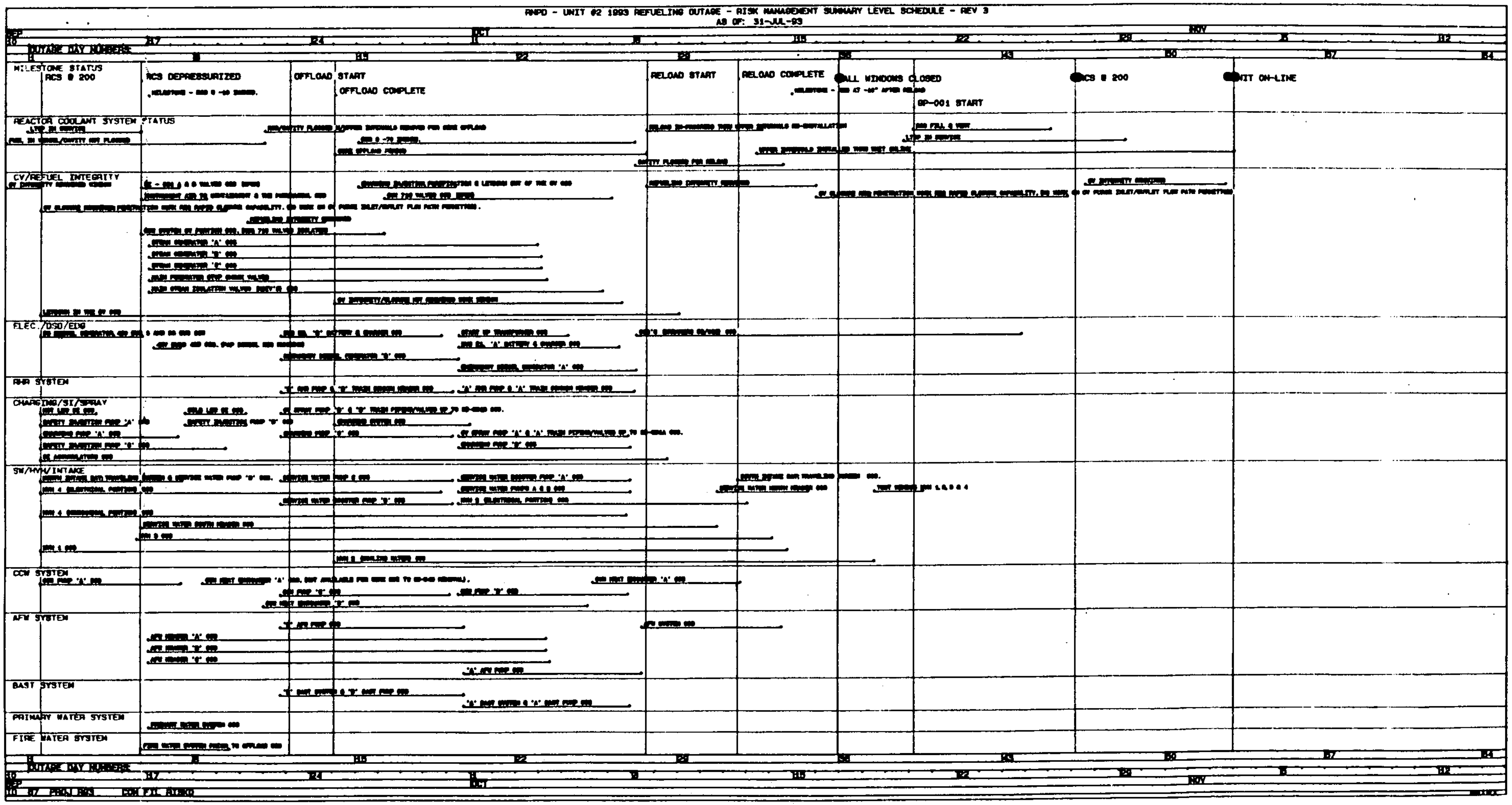
Independent Risk Assessment

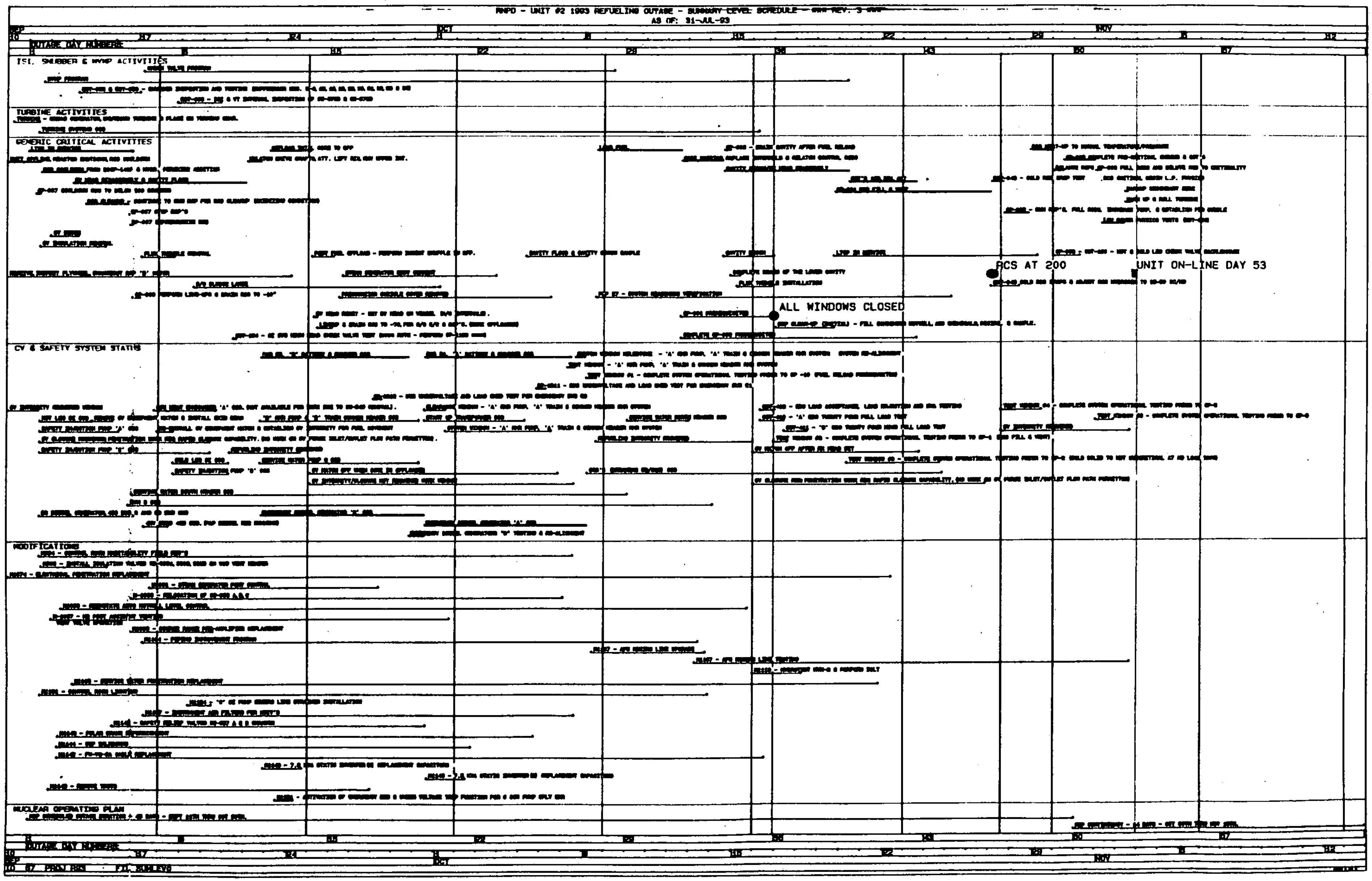
Issues

Containment Vessel Closure/Integrity

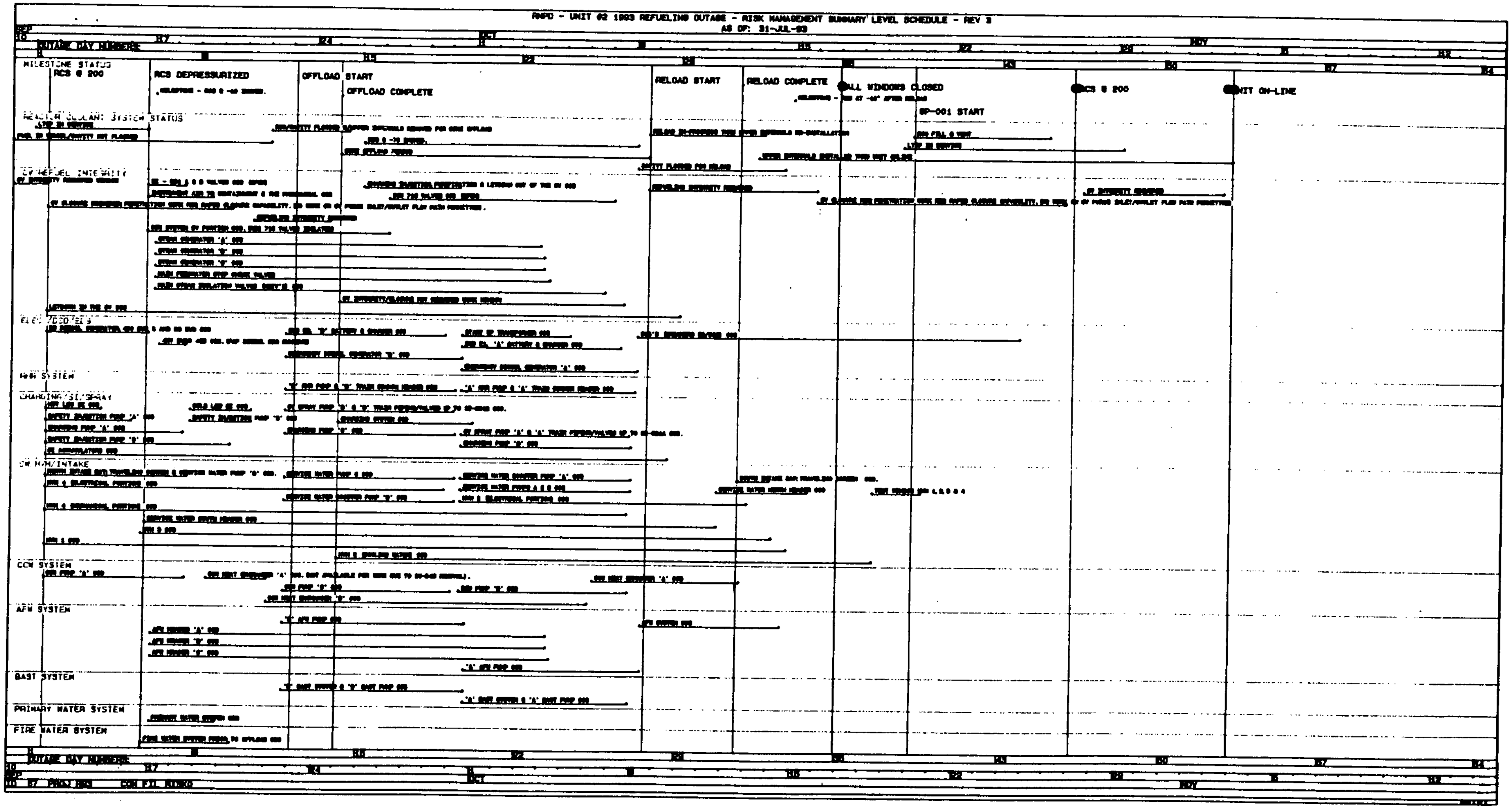
General Employee/Licensed Operator Training

Surveillance Test/Schedule Ties


RNPD - UNIT #2 1993 REFUELING OUTAGE - RISK MANAGEMENT SUMMARY LEVEL SCHEDULE - REV 3
AS OF: 31-JUL-93
SEP
OCT
NOV
10
17
24
1
8
15
22
29
5
12
OUTAGE DAY NUMBERS
1
8
15
22
29
36
43
50
57
64
MILESTONE STATUS
RCS @ 200
RCS DEPRESSURIZED
OFFLOAD START
OFFLOAD COMPLETE
RELOAD START
RELOAD COMPLETE
ALL WINDOWS CLOSED
SP-001 START
RCS @ 200
UNIT ON-LINE
REACTOR COOLANT SYSTEM STATUS
CV/REFUEL INTEGRITY
ELEC./DSD/EDG
RHR SYSTEM
CHARGING/SI/SPRAY
SW/HVH/INTAKE
CCW SYSTEM
AFW SYSTEM
BAST SYSTEM
PRIMARY WATER SYSTEM
FIRE WATER SYSTEM



RNPD - UNIT #2 1993 REFUELING OUTAGE - SUMMARY LEVEL SCHEDULE
AS OF: 31-JUL-93
SEP
OCT
NOV
OUTAGE DAY NUMBERS
ISI, SNUBBER & MVHP ACTIVITIES
TURBINE ACTIVITIES
GENERIC CRITICAL ACTIVITIES
CV & SAFETY SYSTEM STATUS
MODIFICATIONS
NUCLEAR OPERATING PLAN
RCS AT 200
UNIT ON-LINE DAY 53
ALL WINDOWS CLOSED



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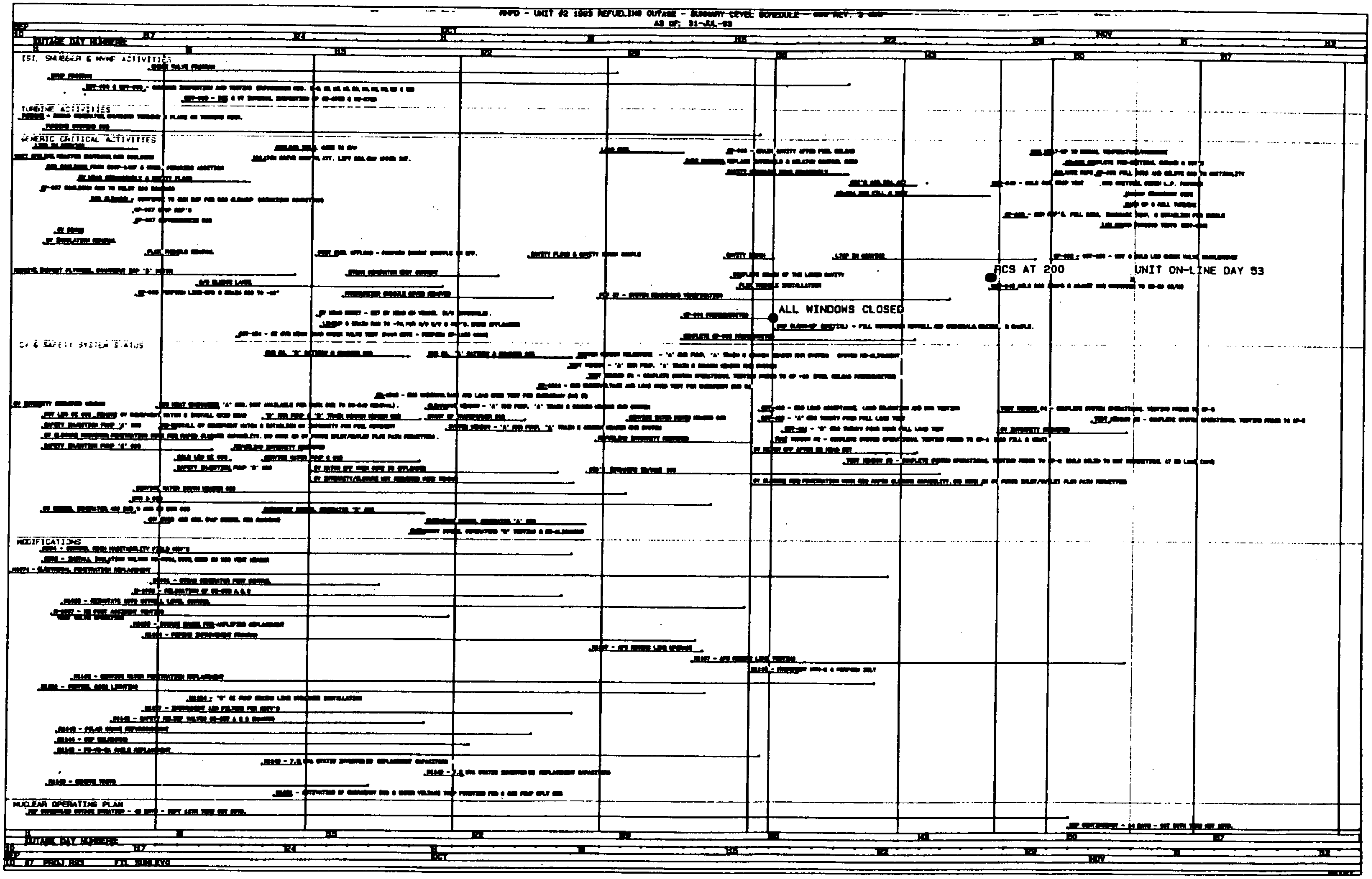
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OUTAGE DAY NUMBERS
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RCS AT 200
UNIT ON-LINE DAY 53
ALL WINDOWS CLOSED
MODIFICATIONS
NUCLEAR OPERATING PLAN
OUTAGE DAY NUMBERS

Independent Risk Assessment (Cont'd)

Recommendations

Publish CV Closure Protected Components On Daily Schedule Report

EDG Surveillance Testing Sequence

Steam Generator Sludge Lancing - Containment Closure/Integrity Requirements

Summary Of RO-15 Schedule

Safety Trains

Boration Of RCS/Forced Purification

CV Equipment Hatch Removal

CV Equipment Hatch Re-Installation

Switchyard Activities

Fuel Movement

Emergency Diesel/Electrical Bus -

Refueling Cavity Flooded

Upper Internals Removed

Summary Of RO-15 Schedule (Cont'd)

Mid-Loop Entry

HVH Cooling/SW Booster Pump - Core Offload

CV Closure

Satisfy Shutdown Safety Functions/Requirements

Emergent Work

Technical Specification Requirements

Authority Of Shift Supervisor

SWOPI Preparation

Assembled CP&L RNP And NED Teams

RNP Team Review Of NRC SWOPI TI-2515/118 And GL-89-12

NED Team Review OF SW Design Calculations & Design Data

NAD SW Assessment

CP&L Results

H. B. Robinson & NED Teams

24 Different Items Identified
21 Items Corrected Prior Or During Inspection
3 Items Assigned To NED Through RETs

NAD Assessment

Maintenance Procedures Revisions
System Descriptions Inaccurate
*Ineffective Communication, Coordination And Field Observation By NED
Mispositioned Valves On CCW HX

SWOPI Inspection - Response To NOVs

- **VIO RII 93-12-01 Failure To Establish Design Controls**

  SW To CCW HX Outlet Valves Minimum Position

  Causes

  Inadequate Interface Between NED/Tech Support
  Design Review Of Procedures Not Performed
  High Pressure Defeat Of Turbine Building Valve
  Isolation Not Considered

  Corrective Actions

  Pressure Limit For Throttling
  Flow Calcs Reviewed Against Operating Procedures
  Formal Transmittal Of Design Data - Tech Support To NED
  Physical Presence Of NED Onsite

- **VIO RII 93-12-01 Failure To Establish Design Controls**

  Configuration Inconsistencies Between OP-903 And Design Documents

  Cause

  Procedure Valve Positions Not Correlated To Design Documents

  Corrective Action

  OP-903 Revised

SWOPI Inspection - Response To NOVs (Cont'd)

- **VIO RII 93-12-03 Epoxy Usage As A Pressure Boundary**

Pressure Boundary Of Safety-Related HX Modified Without Design Evaluation Of The Suitability Of The Application

<u>Causes</u>

EE 82-65 Evaluated Acceptability Of Epoxy

Procedure CM-212 Specified Repair Using Epoxy

EE 82-65 Not Referenced In CM-212

10CFR50.59 Evaluation Not Performed Prior To Each Leak Repair

<u>Corrective Actions</u>

Use Of CM-212 For HX Repair Suspended

Suitability Of Epoxy Presence Under NED Evaluation

Future Use Evaluated Per Design Change Process

Use Of Epoxy For Code Class Pressure Boundary Repairs Only Performed Per GL 90-05

SWOPI Inspection - Response To NOVs (Cont'd)

- **VIO RII 93-12-04 Inadequate Procedure AOP-022**

  Fire Suppression System Backup Supply To Control Room HVAC Coolers - Pressure In Excess Of HX Design Pressure

  Cause

  Oversight During Design Verification Process

  Corrective Actions

  Water Regulator Added To Emergency Repair Equipment
  Emergency Repair Equipment Pre-Staged
  Performance Of DV And V&V On Procedure Change
  Qualification Program Enhanced For Lead Engineers And Design Verifiers

- **VIO RII 93-12-04 Inadequate Procedure AOP-022**

  PWST Backup Cooling Water Supply To SI Pump Bearings - Pressure Insufficient

  Causes

  Backup Options For Beyond Design Basis Event
  Guidance Not Provided On Tank Level Limitations
  Options For Backup Not Prioritized

  Corrective Actions

  PWST Deleted As Option For Cooling SI Pump Bearings
  Remaining Options Prioritized

SWOPI Inspection - Response To NOVs (Cont'd)

- **VIO RII 93-12-07 Failure To Follow Procedure MMM-006**

  Reviews Of Out-Of-Tolerance Calibration Parameters Not Evaluated

  Cause

  Lack Of Maintenance Supervision Understanding Of MMM-006 Processes For Out-Of-Tolerance Calibration

  Corrective Actions

  Maintenance Supervisors Counseled
  Calibration Sheet Sample To Be Reviewed

- **VIO RII 93-12-06 IST Pump Vibration Monitoring Acceptance Criteria**

  Most Limiting Pump Vibration Acceptance Criteria Not Always Established (Reply Not Required)

  CP&L Will Reply, But Not Contest Violation

  Difference In Interpretation Of OM-6 Criteria

  No Specific Guidance When Reference Values Fall Above/Below Reference Criteria

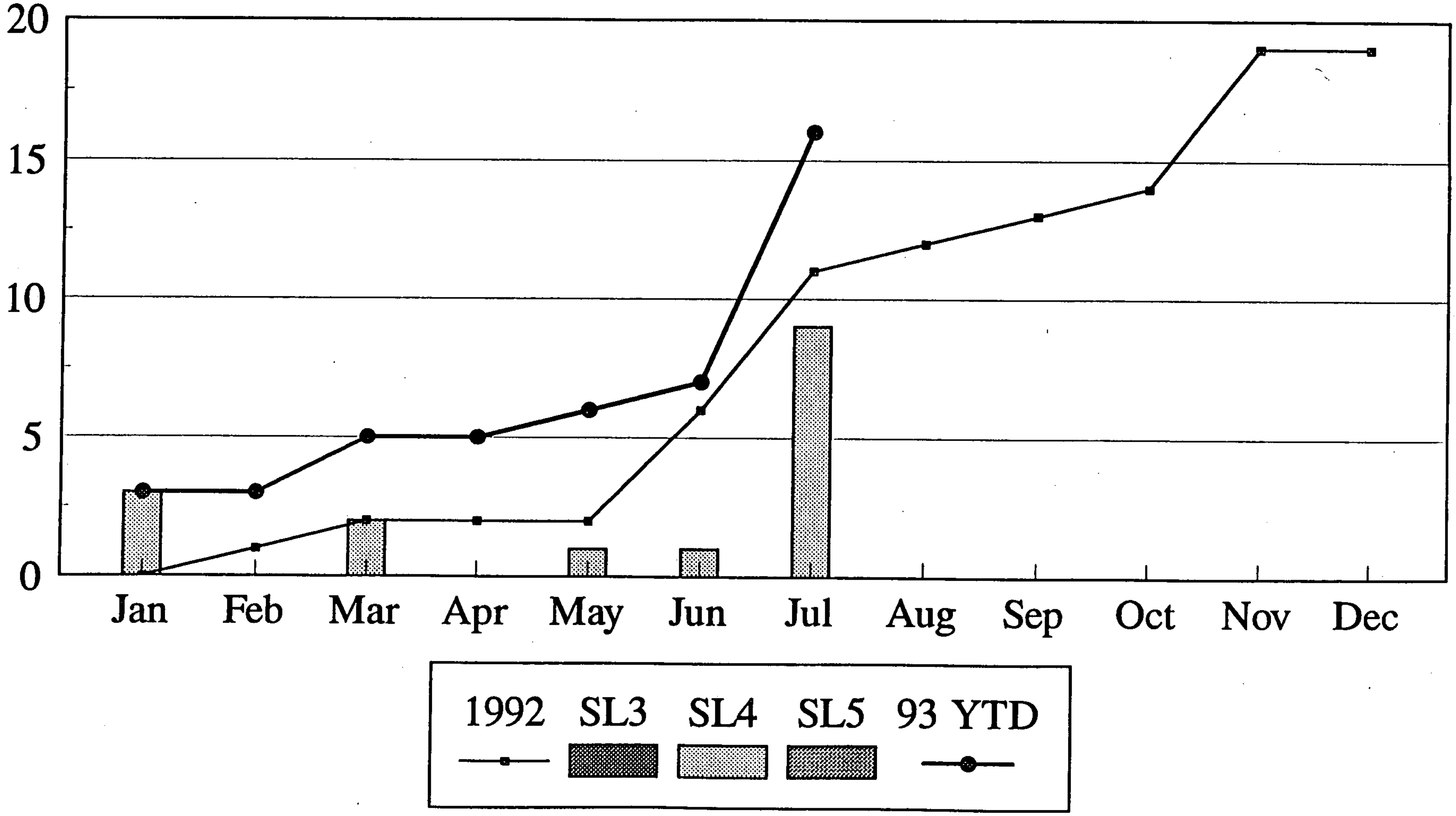
  NRC Interpretation Results In Penalty For Smooth Running Equipment

  Industry Recognized Acceptable Value Of Vibration Not Allowed

  Actions

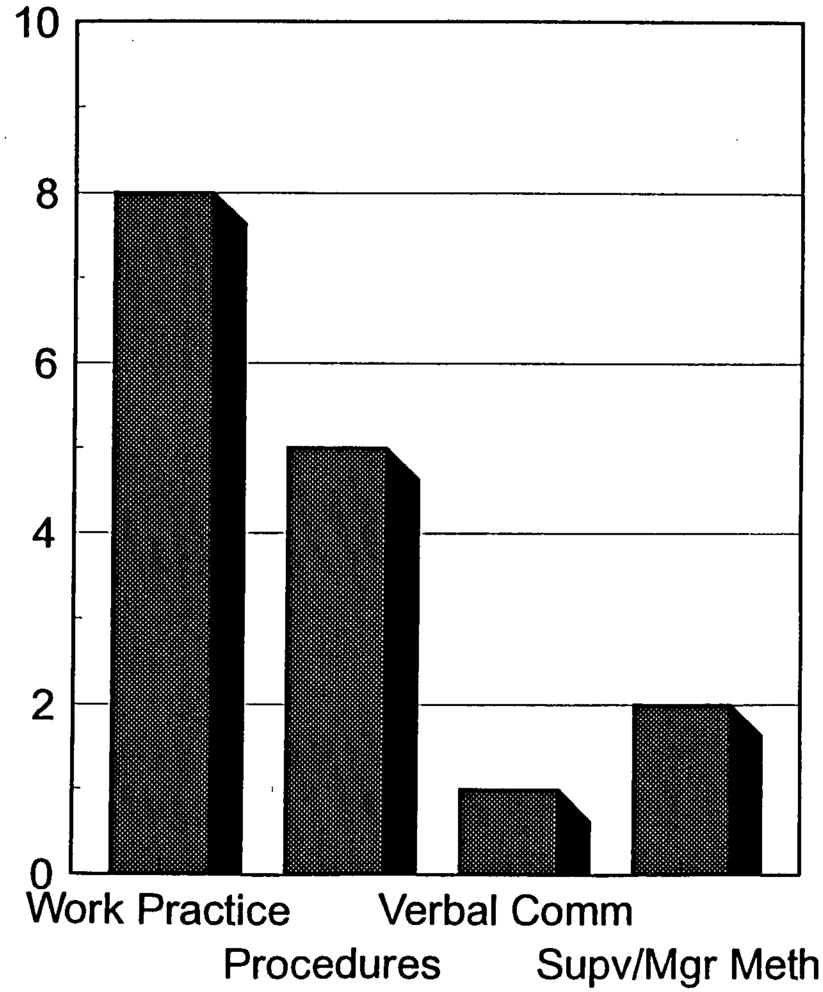
  Procedures Revised To Reflect NRC Interpretation
  Request For Code Interpretation To Be Filed
  CP&L Will Abide By Code Interpretation

NRC Cited Violations
1993 Year-to-Date

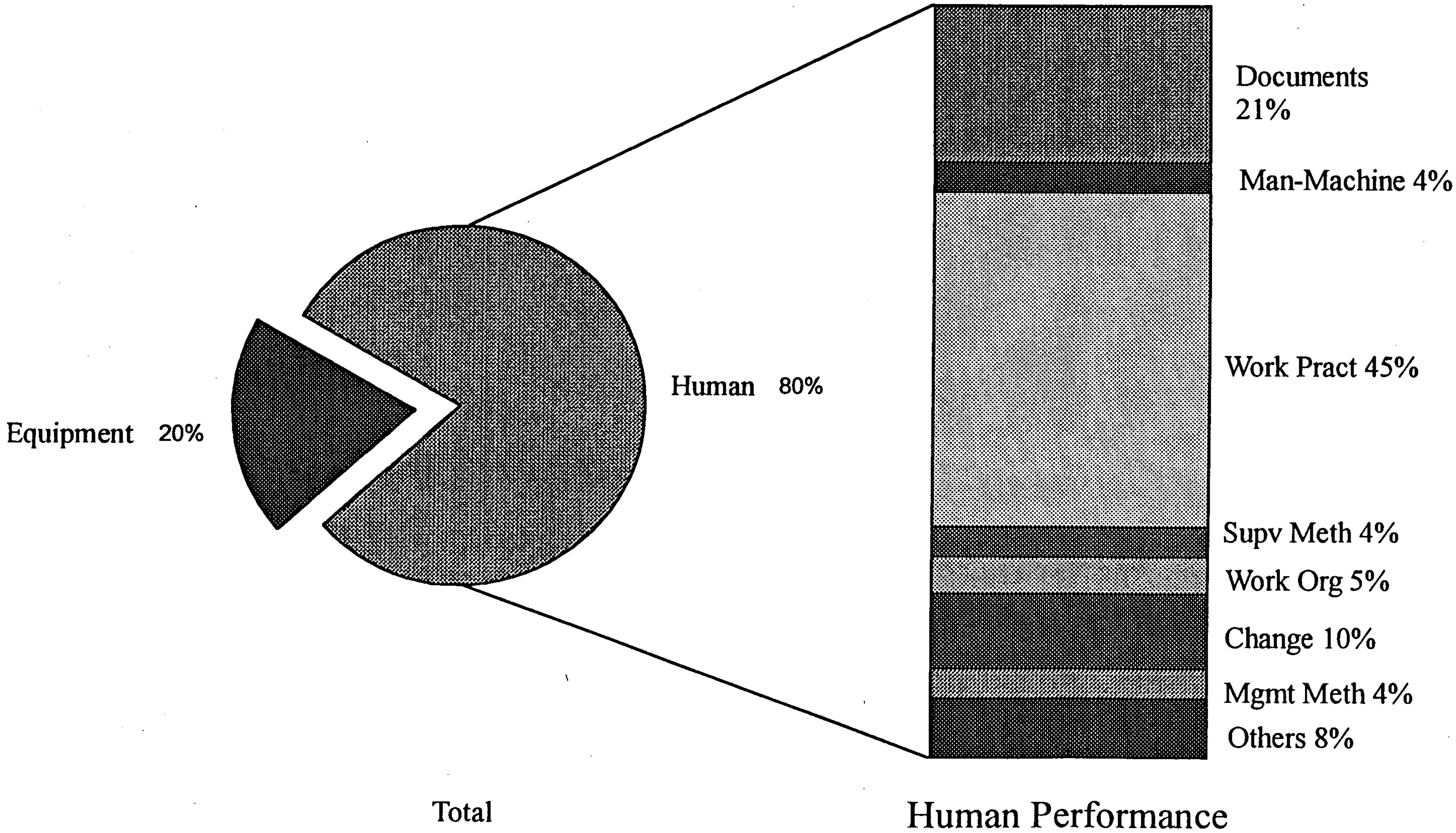


NRC Violations by Cause

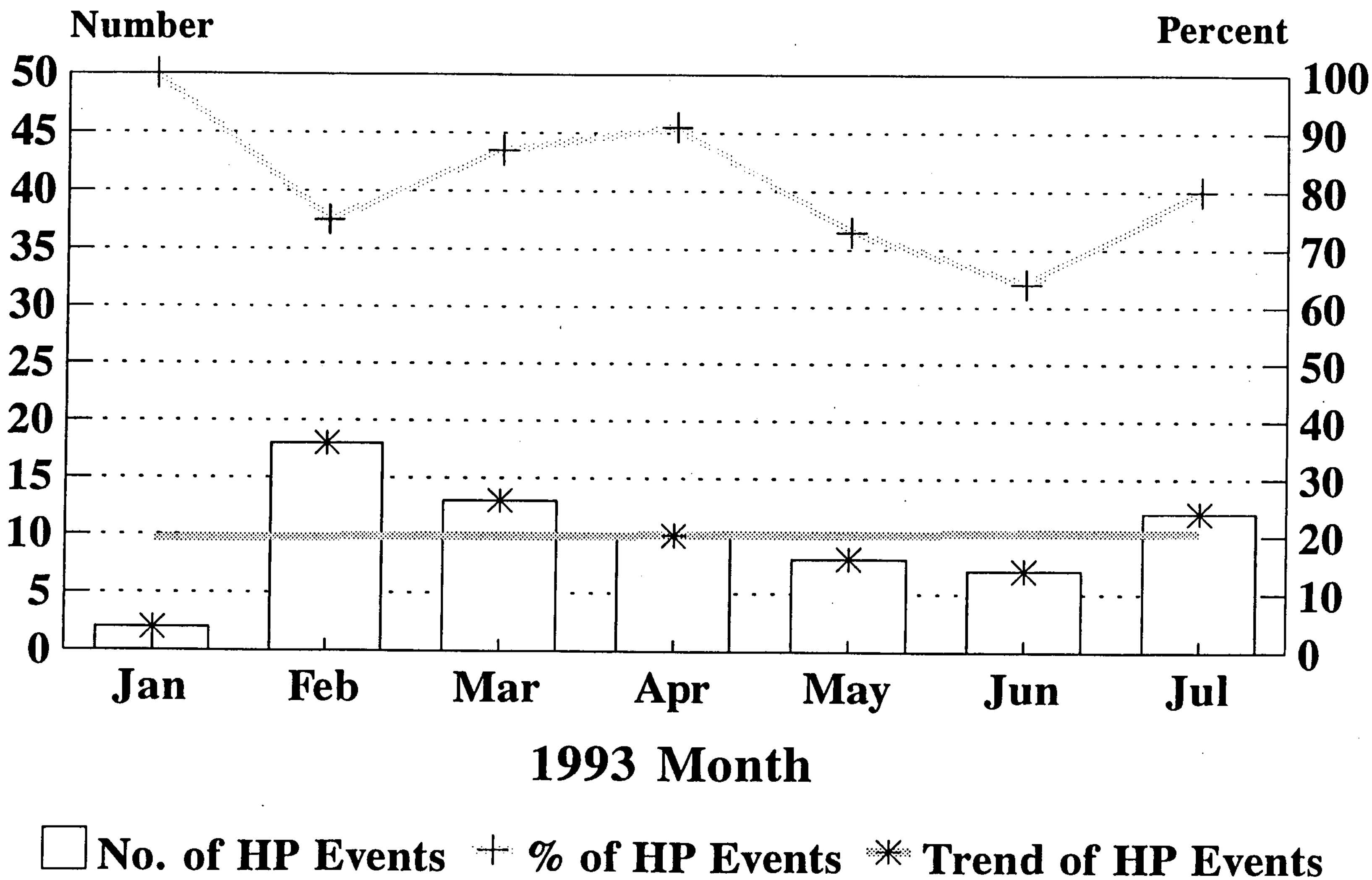
- **Work Practice**
  - AMSAC (93-10)
  - Failure to Post CPEA (92-31)
  - SFP Temperature Indicator (92-34)
  - RHR Pump Operation (92-34)
  - Improper Heat Trace Cable (93-03)
  - Untimely Notification to NRC (93-11)
  - Failure to Maintain CM-008 (93-11)
  - Heat Trace Circuit Alarm/OST-254 (93-11)
- **Procedure**
  - EDG Surveillance Testing (93-07)
  - SWS Design Controls (93-12)
  - Design Change/Belzona (93-12)
  - Inadequate Inst. in AOP-022 (93-12)
  - Instrument Calibration Checks (93-12)
- **Verbal Communication**
  - Security Door (93-14)
- **Supv./Mgr. Methods**
  - Welder's Qualifications (93-03)
  - Vibration Accept. Criteria (93-12)



ACR Causes
January - July 1993



Human Performance
Inappropriate Acts



HP = Human Performance

Service Water System Operational Performance Inspection

Five Cited Violations

Two Non-Cited Violations

Two Inspector Follow-Up Items

Weaknesses, Negative Statements, Programmatic Indicators

Issues Arising From SWOPI Inspection

Verbal/Written Communications

Written Documents And Procedures

- Configuration Control

Work Practices

- Attention To Detail/Level Of Detail
- Procedure Use And Adherence

Root Cause And Corrective Actions

Engineering/Technical Aggressiveness

Design Review Of Temporary Repair Processes

Initiatives To Address SWOPI Issues

SSFI Assessments - Vertical Slice

Directed Assessments - Horizontal Slice

Utilization Of Design Basis Information

Programs To Address Human Performance/SWOPI Issues

STAR

Procedures Use And Adherence Team

Self-Assessment Program

Configuration Management Task Force

CAP Enhancements

Reorganization