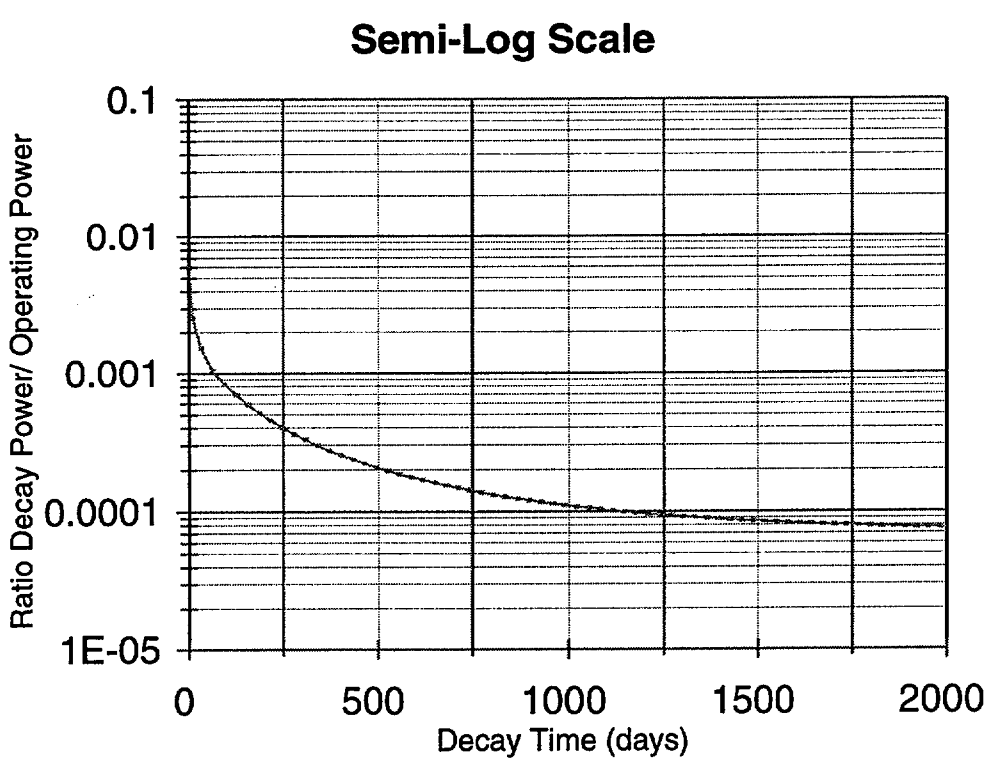
file date 12/29/99

6.0 Normal Operation Considerations and Programs

6.1 Decay Heat Reduction and Radionuclide Inventory Changes Over Time

For some period of time following permanent shutdown of the reactor, the events which cause the loss of all water from the spent fuel pool will result in the most significant offsite consequences. One of the factors that control the potential for a zirconium fire is the amount of latent heat in the spent fuel. This parameter is dependent on time. The latent heat decreases as time increases from when the plant has been shutdown. Figure 6.1-1 shows the reduction in the ratio of decay power to operating power over the first 2000 days following shutdown If sufficient heat exists to raise the temperature of the spent fuel to the level that self-sustaining oxidation of the zirconium clad occurs, then a large radiological release could follow. Immediately after shutdown, the amount of latent heat being generated by the spent fuel is decreasing rapidly. Within a few months, the short-lived radionuclides have reduced to negligible amounts and only long-lived radionuclides are contributing to the latent heat. Figure 6.1-1 shows that after one year, approximately 0.028 percent of the operating power is generated in the spent fuel. This is about a factor of 5 reduction from 30 days after shutdown, at which time the fuel is generating about 0.15 percent of operating power. As time passes, sufficient heat will not exist to heat the fuel to the point where self-sustaining oxidation of the zirconium clad could occur and a radiological release is no longer possible. Additional parameters that affect the length of time that a loss of water accident can cause a radiological release and an estimate of the time period that self-sustaining zirconium oxidation could occur is discussed in Section 2 of this report.

Figure 6.1-1 Decay Power/ Operating Power Ratio vs. Time



Q/137

As with the amount of latent heat generated by the spent fuel, the radioisotope inventory is a time dependent parameter. Within a few months of permanent shutdown of the reactor, the dose consequences from a spent fuel pool accident at a decommissioned plant are different than from a operating reactor accident. The source terms are not the same. For a decommissioned plant, the dose consequences are dominated by long lived radionuclides, such as cesium, which has a 30-year half-life. The health effects are mainly latent cancer fatalities due to long term exposure of cesium, as discussed in Appendix 6. The acute health effects that are a concern for reactor accidents are caused by short lived radionuclides, such as iodine, that are no longer present several months following the permanent cessation of reactor operations. The evaluation showed that about a factor of two reduction in prompt fatalites if the accident occurred after 1 year instead of after 30 days.

6.2 Design Basis Events

Design criteria for the storage of spent nuclear fuel requires that fuel storage and handling systems be designed to assure adequate safety under normal and postulated accident conditions. In addition, these systems are to be designed with appropriate containment, confinement, and filtering systems, and be designed to prevent significant reduction in the coolant inventory under accident conditions. Design guidance for fuel storage facilities includes preventing the loss of SFP coolant from the pool that would result in the fuel becoming uncovered, protecting the fuel from mechanical damage, and providing the capability for limiting potential offsite exposures in the event of a significant release of radioactivity from the fuel.

Unless mitigative measures are taken, loss of water from the SFP during the initial decay period of about 3 to 5 years could cause overheating of the spent fuel and result in damage to the fuel cladding integrity and could result in release of radioactive materials to the environment. Events considered in the spent fuel storage facility design with the potential to cause significant inventory loss from the SFP include:

- Earthquakes
- Loss of cooling
- Siphoning
- Dropping of heavy loads
- Other external events that could compromise the inventory of the pool

Fuel storage facility features designed to prevent significant inventory loss from the SFP include a seismically qualified SFP structure, redundant, and in some cases, seismically qualified SFP cooling systems (some with safety related power supplies), seismically qualified and safety-related SFP coolant makeup systems, anti-siphon protection, local and remote level indication, local and remote radiation alarms, pool structure designs that plan for the effects of a dropped spent fuel cask without significant leakage from the fuel storage area.

Even a small amount of mechanical damage to the spent fuel stored might cause an offsite radiological release if no dose reduction features, such as iodine removal, are provided.

Mechanical damage resulting in radiological releases from the spent fuel can occur from the following events:

- Dropping fuel assemblies during fuel handling operations
- Dropping objects onto the stored fuel
- Impacting the stored fuel with internally or externally generated missiles

Fuel storage facility features designed to prevent mechanical damage to the stored fuel include a pool structure design that prevents missiles from impacting the stored fuel, and physical design features and administrative controls are used that minimize the possibility of damaging the stored fuel by dropping a fuel assembly or dropping a heavy object onto the stored fuel.

For SFPs not located within the reactor containment, without adequate protective features, radioactive material could be released to the environs as a result of either loss of water from the SFP or mechanical damage to the fuel within the pool. Should radioactive material be released from the stored fuel, design requirements to provide a controlled leakage building surrounding the SFP with the capability to limit releases of radioactive material address this concern.

6.3 Operating Experience Effecting Decommissioning Plants

6.3.1 Bulletin 94-01

The NRC issued Bulletin 94-01 on April 14, 1994, due to an incident at Dresden Unit 1 that provided new insights to the importance of proper maintenance of the spent fuel, pool, and environment at decommissioning plants. On January 25, 1994, the licensee for Dresden 1 discovered approximately 200 m [55,000 gallons] of water in the basement of the unheated Unit 1 containment. The water originated from a rupture of the service water system piping inside the containment that had been caused by freeze damage to the system. The licensee investigated further and found that, although the fuel transfer system was not damaged, there was a potential for a portion of the system inside the containment to fail and result in a partial draindown of the spent fuel pool (SFP) that contained 660 spent fuel assemblies. The licensee implemented several specific actions to guard against further damage from freezing and appointed a team to investigate the status of Dresden 1.

The NRC dispatched a team of inspectors from the Offices of Nuclear Reactor Regulation (NRR), Nuclear Material Safety and Safeguards, and Region III to conduct a special inspection of the circumstances surrounding the event. Based on these reviews the following conditions existed:

Heating had not been provided to the Dresden 1 containment for the 1989/1990 and subsequent heating seasons. The lack of heating inside the containment under more severe weather conditions could potentially have resulted in the freezing and rupture of the fuel transfer tube. Failure of the fuel transfer tube could have drained the SFP to several feet below the top of the stored fuel assemblies. The loss of water shielding would have created onsite personnel hazards from the high radiation fields.

The water quality in the SFP was poor. The original cleanup and cooling system was shut down in 1983; by 1987 the water quality had degraded to the point that an influx of microorganisms had developed. Concerned that the microorganisms might cause microbiologically induced corrosion, the licensee installed a temporary system to clean up the pool. The temporary system proved to be incapable of restoring the water quality to an acceptable level. Licensee records show that the conductivity in the pool exceeded the technical specification limit of 10 mho per centimeter by about a factor of two. Also, the licensee estimated that approximately 90 stored fuel bundles had leaking fuel pins resulting in elevated concentrations of cesium-137 of about 370 Becquerels/ml [1 x 10-2 Ci/ml].

A number of obsolete piping lines from the original pool cleanup and cooling system remained in the SFP and were potential siphon paths that could reduce the pool level.

Because the SFP gate was not installed it could not have prevented a draindown of the pool if the fuel transfer pool or tunnel had emptied. The NRC inspectors noted that the gaskets and steel mating surfaces for the spent fuel gate had been exposed to adverse biological, chemical, and radiological conditions that may have affected their ability to seal had the gate been installed.

The licensee had no SFP leak detection or water inventory program. The observed cracks in the unlined concrete pool indicated a potential for pool leakage.

Site personnel had for some time focused their attention on the operating units and assumed that no significant problems would occur at Dresden 1. Interviews with personnel at the Dresden site (which includes two operating units in addition to Dresden 1) showed that, in part, the weaknesses identified above were based on an incorrect belief that Dresden 1 could not cause a serious safety problem because it was permanently shut down. This belief resulted in audits and safety evaluations that were not rigorously implemented or that did not include the Dresden 1 systems and programs. However, as noted above, significant safety considerations did exist.

It is necessary to maintain an adequate inventory of water in the spent fuel pool to safely store spent fuel. A proper depth of SFP water provides protection for plant personnel from excessive exposure to radiation from spent fuel and other materials stored in the spent fuel pool. Control of the exposure of plant personnel is required by Part 20 of Title 10 of the Code of Federal Regulations (10 CFR Part 20). Rapid loss of SFP water inventory may result from a failure of piping connected to the SFP or from a siphoning action of piping as a result of an improper valve alignment. A loss of SFP water inventory may also result from a failure of seals or gaskets used as part of the SFP boundary. If seals and gaskets are allowed to become degraded, a leak may increase rapidly once it initiates. Failure to have a leak detection system or a water inventory program may allow leakage of SFP water to go undetected.

Proper maintenance and operation of SFP systems is necessary to maintain water quality and radionuclides at acceptable levels. Maintenance of water quality is necessary to prevent degradation of the spent fuel and other stored materials stored in the SFP (i.e., control rod blades or incore instrument strings). Proper SFP water treatment programs prevent the buildup of excessive concentrations of radionuclides. Proper maintenance of the SFP and the support systems would also mitigate the consequences of any potential release from the SFP.

Upon receipt of Bulletin 94-01, all of the action addressees were requested to take the following actions to ensure that the quality of the SFP coolant, and the cooling and shielding for fuel or equipment stored in the SFP is not compromised and that all necessary structures and support systems are maintained and are not degraded.

1. Verify that the structures and systems required for containing, cooling, cleaning, level monitoring and makeup of water in the SFP are operable and adequate, consistent with the licensing basis, to preclude high levels of radionuclides in the pool water and adverse effects on stored fuel, the SFP, fuel transfer components, and related equipment.

2. Ensure that systems for essential area heating and ventilation are adequate and appropriately maintained so that potential freezing failures that could cause loss of SFP water inventory are precluded.

3. Ensure that piping or hoses in or attached to the SFP cannot serve as siphon or drainage paths in the event of piping or hose degradation or failure or the mispositioning of system valves.

4. Ensure that operating procedures address conditions and observations that could indicate changes in SFP level and address appropriate maintenance, calibration and surveillance of available monitoring equipment. This should include any leak detection systems.

6.3.2 Summary of Other Events

Palo Verde 3 3/6/97

Unusual event declared due to partial draindown of spent fuel pool due to low air pressure in an inflatable seal associated with the gate between the spent fuel pool and the transfer canal.

Waterford 3 4/28/97

Dropped new fuel assembly during fuel movement in the spent fuel pool. Assembly fell from the spent fuel handling tool and came to rest between cells DD20, EE20, DD21, and EE21 leaning against the south wall.

Waterford 3 5/21/97

Radioactive water spilled from the spent fuel pool under the fuel handling building (FHB) railroad bay doors to the plant protected area. Some of the water that escaped the FHB entered the storm drain system. The affected portions of the storm drain system were isolated. Some low level radioactive water was detected outside the plant protected area in a dead-ended portion of the storm drain system between the FHB and the administration building.

Millstone 3 6/26/97

Component cooling water system had been lined up to the "A" spent fuel pool heat exchanger instead of "B" heat exchanger. This was discovered when spent fuel pool temperature increased from 87°F to 97°F.

Point Beach 1 2 2/6/98

Non-conservatism discovered in seismic analysis for the spent fuel pool.

Browns Ferry 3 12/28/98

Spent fuel pool temperature increased approximately 25 degrees F over a two day period after swapping from the "3A" to the "3B" cooling pump. Investigation determined that the "3B" heat exchanger outlet was being short cycled through the out of service "3A" cooling pump through a stuck open pump discharge valve. This temperature increase was not detected by the normal control room monitoring temperature element.

Big Rock Point 2/3/99

Approximately 1,016 gallons of spent fuel pool water was inadvertently drained to the radioactive waste treatment system through a filtration/pump skid when a break was taken from a maintenance activity using the skid. The skid was lined up to take suction from the spent fuel pool surge tank and discharge to the spent fuel pool .

LaCrosse 1 3/5/99

Seismic concern with maintaining spent fuel pool water level if the spent fuel pool return line (enters bottom of the spent fuel pool) ruptures during a seismic event.

6.3.3 Operating Experience Summary

The events demonstrate the importance of proper maintenance, surveillance, and design vulnerabilities that may affect a plant while decommissioning.

Bulletin 94-01 actions are important to ensure that the quality of the SFP coolant, and the cooling and shielding for fuel or equipment stored in the SFP is not compromised and that all necessary structures and support systems are maintained and are not degraded.

Many decommissioning plants have technical specifications to ensure that some of actions are fulfilled. The most significant technical specifications are SFP level, radiation monitoring, crane inspection, water chemistry program, and cold weather program. For the SFP level, several plants instituted two level requirements, a high level for fuel movement and a low level to ensure proper shielding. The SFP level or lower level technical specification is generally applicable at all times fuel is store in the pool. Of the technical specifications listed, only SFP level when fuel is being moved is required. The remainder are not required by regulation but were seen as important to safety.

We recommend that all decommissioning plants respond to and maintain the capabilities addressed in Bulletin 94-01 as long as fuel is stored in the spend fuel pool.

6.4 Fire Protection

The fire protection requirements for operating reactors are provided by General Design Criterion (GDC) 3 of Appendix A to 10 CFR Part 50, 10 CFR 50.48, and Appendix R to 10 CFR Part 50. The primary objective of the fire protection program for operating reactors is to minimize fire damage to structures, systems, and components (SSCs) important to safety, to ensure the capability to safely shut down the reactor and maintain it in a safe shutdown condition. The safe shutdown objective is not applicable during decommissioning, with the reactor permanently shut down and the fuel removed from the reactor vessel. After a determination has been made that the maximum credible accidents do not require offsite emergency protective action, the primary fire protection concern for permanently shutdown plants is protecting the integrity of the spent fuel and preventing or minimizing the release of radioactive materials resulting from fires involving contaminated plant SSCs or radioactive wastes.

Accordingly, 10 CFR 50.48(f) requires the licensee of a permanently shutdown nuclear power plant to maintain a fire protection program to address the potential for fires that could result in the release or spread of radioactive materials. The goal of the fire protection program during decommissioning of nuclear power plants is to provide an appropriate level of defense-in-depth protection against the threat of fire. Its objectives are to (1) reasonably prevent fires from occurring, (2) rapidly detect, control, and extinguish those fires that do occur, and (3) minimize the risk of fire-induced radiological hazards to the public, the environment, and plant personnel. The fire protection program is maintained until all radiological hazards are removed from the site or until the Part 50 license is terminated and the site is released for restricted or unrestricted use.

Draft guidance on the fire protection program for permanently shutdown plants is provided by Draft Regulatory Guide 1069, "Fire Protection Program for Nuclear Power Plants During Decommissioning and Permanent Shutdown." The draft guide contains specific guidance on the level of fire protection to be provided for structures, systems and components (SSCs) that are necessary to provide protection of the spent fuel.

6.5 Quality Assurance

Part 50 of Title 10 to the CFR, Appendix B quality assurance (QA) requirements apply to all activities affecting the safety-related functions of those SSCs that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. These activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, and modifying.

Safety-related structures, systems, and components are those SSCs that are relied upon to remain functional during and following design basis events to assure:

(1) The integrity of the reactor coolant pressure boundary,

(2) The capability to shut down the reactor and maintain it in a safe shutdown condition; or,

(3) The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to the applicable guideline exposures set forth in §50.34(a)(1) or §100.11.

Upon docketing of certifications required by §50.82(a)(1) for permanent cessation of operations and permanent removal of fuel from the reactor vessel, the license under Title 10 of the CFR no longer authorizes operation of the reactor or emplacement or retention of fuel into the reactor vessel. After the reactor fuel has been permanently removed from the vessel and placed in the spent fuel pool, potential offsite releases are the primary safety consideration.

Subsequent to permanent relocation of all fuel to the spent fuel pool, licensees may apply the §50.59 regulatory change control process to declassify SSCs that no longer perform safety functions associated with maintaining the reactor coolant pressure boundary or with the capability of shutting down the reactor. Reclassification of safety-related equipment through the §50.59 process may considerably reduce the number of SSCs subject to Appendix B QA requirements.

For a plant in decommissioning status, the provisions of 50.34(b)(6) (ii) require retention of a QA program, including a discussion of how the applicable requirements of 10CFR50, Appendix B will be satisfied. To date, licensees have retained their approved QA programs through the decommissioning phase. Although considerable simplification in the management, administration, and oversight of the QA program may be possible, the requirements of the eighteen Appendix B criteria remain applicable to any equipment or structure that performs a safety function. Changes to a licensee's QA program that reduce the licensee's existing commitments are submitted for NRC approval, pursuant to 10 CFR 50.54(a)(3).

Beyond decommissioning activities, licensees can use their approved Appendix B programs (following review for applicability) for packaging and transportation of radioactive material (Part 71) and for storage of spent nuclear fuel and high-level radioactive waste (Part 72).

An alternate approach, planned by one licensee, would be to submit a new quality assurance program specifically applicable to decommissioning activities. If such a program were submitted, we would review it for conformance with Appendix B criteria in accordance with Standard Review Plans (SRP) 17.1/17.2. Pursuant to §50.34(b)(6)(ii), this review would extend to the determination of <u>how</u> Appendix B requirements would be satisfied through licensee commitments to applicable regulatory guides and industry standards. We would review for acceptability any proposed alternatives to NRC-endorsed industry standards.

Changes to technical specification (TS) administrative controls (§50.36(c)(5, 6)) related to quality assurance are reviewed in accordance with applicable standard review plans, regulatory guides, industry standards, and other regulatory guidance, such as the proposed standard technical specifications for permanently defueled Westinghouse plants (NUREG-1625). Relocation of TS administrative controls to the licensee's QA program description are reviewed using the guidance contained in Administrative Letter 95-06.

6.6 Maintenance Rule

6.6.1 Identification of Maintenance Rule Concepts at Decommissioned Plants

Maintenance Rule (MR) concepts at decommissioned plants are expressed in 10CFR50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants." The rule also provides the fundamental regulatory requirements for maintenance rule and scoping of structures, systems, and components (SSCs) at decommissioning status plants (DSPs). Scoping requirements have been established as "...For a nuclear power plant for which the licensee has submitted the certifications specified in 50.82(a)(1), this section only shall apply to the extent that the licensee shall monitor the performance or condition of all structures, systems, and components associated with the storage, control, and maintenance of spent fuel in a safe condition, in a manner sufficient to provide reasonable assurance that such structures, systems, and components are capable of fulfilling their functions..."

Normally a DSP will have already submitted the 50.82(a)(1) certification; this will satisfy the status statement for a plant as quoted above. So, from a practicable maintenance rule viewpoint we only need worry about how the DSP licensee provides for: *"... monitoring the* *performance or condition of all SSC associated with the storage, control, and maintenance of spent fuel in a safe condition...."*

6.6.2 Identification of Potential Systems, Equipment, Functions at Decommissioned Plants

The MR section of IQMB has conducted workshops and provided a "staff support member" for three onsite inspections of MR implementation at shutdown plants. Consequently, by consultation at the workshops and precedent at the three sites inspected, a scoping list of expected SSCs has been developed. Among those generic SSCs that may be in the scope of the Maintenance Rule for DSPs are the following:

- Spent fuel pool cooling and cleanup (SFPCC)
- Spent fuel pool structure and any connecting piping system seals
- Spent fuel pool building
- Radiation monitors above or in the spent fuel pool
- Standby service water system (i.e., the portion that is heat sink for SFPCC heat exchangers)
- For boiling water reactors, the residual heat removal system can also be used for spent fuel pool cooling
- Leak detection system (this system detects leakage from the spent fuel pool, the transfer pool, and reactor well pool liners. Portions of this system that detect leakage from the spent fuel pool could be under the scope of the Maintenance Rule)
- Heating, ventilation and air conditioning system above the spent fuel pool
- Spent fuel pool water level instrumentation and control
- Spent fuel pool emergency or normal makeup water supply
- Spent fuel pool crane (i.e., may need to be included as a result of accident scenarios involving dropped fuel bundles, which could cause cladding damage and potential radiation exposure to personnel in the spent fuel pool area.)
- Standby auxiliary ac power system (i.e., the power supply to SFPCC pumps)
- Spent fuel pool transfer tube penetration seals or bellows, pneumatic air system which inflates the seals, and transfer tube gate seals (i.e., failure of these seals could cause a spent fuel pool drain down to a few feet above top of active fuel, the area around the spent fuel pool would become a very high radiation area, and plant staff would need to evacuate the spent fuel pool area).

This list will vary depending on the circumstances of each individual DSP and is only intended to be a representative list.

The MR requires that SSCs be monitored for reliability and availability by the licensee. MR policy recognizes that the longer a plant is shutdown the less likely that fuel is vulnerable to zircaloy oxidation. Consequently, *the stringency of reliability and availability standards are graded accordingly.*

6.6.3 Evaluation of What Maintenance Rule Means to Decommissioned Plant Oversight.

Background For Implementation of The Maintenance Rule For Decommissioning Status Plants

The maintenance rule was effective July 1996 and amended August 1996 to include nuclear plants which have submitted the certifications specified in 10 CFR 50.82(a)(1) (i.e. decommissioning status plants). As amended the rule requires licensee's to monitor the performance or condition of SSCs associated with the storage, control and maintenance of spent fuel in a safe condition and in a manner sufficient to provide reasonable assurance that such SSCs are capable of fulfilling their intended functions.

Subsequent to the August revision of §50.65, the associated RG 1.160, "Monitoring The Effectiveness Of Maintenance At Nuclear Power Plants," and NUMARC 93-01, " Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," were revised to address the amended rule provisions for decommissioning status plants. (NUMARC 93-01 is the industry guideline for monitoring the effectiveness of maintenance at nuclear power plants and has been endorsed by the NRC's Regulatory Guide 1.160.)

Overview of Implementation of The Maintenance Rule For Decommissioning Status Plants

Implementation of the maintenance rule for decommissioning status plants has been fundamentally the same as for operating facilities; however, the population of SSCs within scope were reduced.

Relative to the scope of SSCs that would be applicable for a decommissioning status plant, licensee's need to focus on the functions necessary for the preservation of spent fuel in a safe condition. For decommissioning status plants, the explicit process related to risk ranking of SSCs, delineated in NUMARC 93-01, may not be necessary.

Expectations For Implementation of The Maintenance Rule For Decommissioning Status Plants

Licensees for decommissioning status plants will continue to establish SSC performance measures and condition monitoring as well as the requisite goals and preventive maintenance activities consistent with the requirements of the rule.

SSCs would be considered to be in the (a)(1) category when the performance or condition of the SSC does not meet established goals and corrective actions are required.

SSCs would be considered to be in the (a)(2) category when it has been demonstrated that the performance or condition of the SSC is being effectively controlled through the performance of appropriate preventive maintenance.

Licensee's Periodic Evaluation of the Effectiveness of the Maintenance Rule for Decommissioning Status Plants

Effectiveness of the maintenance rule implementation process will be evaluated by licensee's at a periodicity not to exceed 24 months between evaluations. Balancing reliability and availability are part of the periodic evaluations. Preventive maintenance safety assessments are done on an ongoing basis.

6.7 Safeguards for Spend Fuel Pools at Decommissioning Plants

There are no specific regulations for relaxation of physical security requirements at power reactor licensees which have certified permanent cessation of operations and fuel removal to the spent fuel pool in accordance with 10 CFR 50.82 and associated with the eventual termination of their Part 50 license. In order to address the license termination process concerning a security program at the site, licensees have submitted requests for exemptions from specific regulations in 10 CFR 73.55, justifying this approach on the fact the number of target sets susceptible to sabotage attacks has been reduced and the remaining target sets, even if subject to sabotage attacks, pose a reduced hazard to the public health and safety. We has addressed this problem in the past by processing these exemption requests on a case-by-case basis. However, a regulation would provide a more uniform basis for our actions; therefore, we are proposing a rulemaking to revise security regulations rather than to continue to regulate by issuing license exemptions.

On January 20, 1999, the safeguards staff submitted to the Commission SECY-99-008, "PHYSICAL SECURITY/SAFEGUARDS FOR PERMANENTLY SHUTDOWN POWER REACTORS," which would amend 10 CFR PART 73 to include regulations for the subject sites. Base upon a technical staff briefing on March 17,1999 we received Staff Requirements Memorandum (SRM) dated June 23, 1999, asking them to consider an integrated, risk-informed decommissioning rule versus individual rulemakings to address financial protection requirements, emergency preparedness, safeguards, backfit, and fitness-for-duty. On June 29,1999, the safeguards staff received an additional SRM regarding SECY-99-008 which also directed it to include safeguards issues in a combined rulemaking. We responded to the Commission on June 30, 1999, with SECY-99-168, "IMPROVING DECOMMISSIONING REGULATIONS FOR NUCLEAR POWER PLANTS" which indicated that they would prepare a combined rulemaking once the "Technical Study of Spent Fuel Pool Accidents for Decommissioning Plants has completed its work in March 31, 2000.

6.7.1 Current Regulatory Framework

Current licensees that have permanently shut down their reactor operations and have stored the spent fuel in the pool are required to meet the security requirements for operating reactors in 10 CFR 73.55 for protecting the site against the design-basis threat defined in 10 CFR 73.1(a)(1). This level of security would require a site with a permanently shutdown reactor to provide protection at the same level as that for an operating reactor site. By removing the fuel from the reactor and rendering the reactor inoperable, a significant reduction in risk to public health and safety from reactor sabotage is realized.

In an associated regulatory arena, 10 CFR 73.51, "Physical Protection for Spent Nuclear Fuel and High-Level Radioactive Waste," allows facilities not associated with an operating power reactor to store spent fuel at an Independent Spent Fuel Storage Installation (ISFSI). This rule provides performance-based regulations specifically designed for these types of storage installations, i.e., fuel in dry cask containers or other storage formats. The objective of the 10 CFR 73.51 rule was to reduce regulatory burden regarding security requirements without reducing protection levels to public health and safety for spent fuel storage not associated with an operating reactor. When 10 CFR 73.51 was drafted, it included permanently shutdown reactors, but these types of facilities were withdrawn from the rule when NRR technical staff identified the potential safety issue addressed herein. Failure of 10 CFR 73.51 to account for the risk posed by vehicle-borne bombs at facilities where potential criticality and fuel heat-up were still an issue resulted in the removal of permanently shutdown Part 50 licensees from the scope of the rule.

We intend to prepare a performance-based regulation similar to 10 CFR 73.51 that will reduce the regulatory burden and will be appropriate for spent fuel storage at power reactor sites, but one which will account for the threat of vehicle-borne bombs. In addition security officers will be armed, but the bullet resisting alarm station will not necessarily in the protected area.

6.7.2 How Rulemaking Will Address the Regulatory Problem

The proposed rulemaking would provide regulations that specifically apply to power reactor sites that have permanently ceased operations. The new rulemaking will codify and consolidate current regulations at a level commensurate with the reduced sabotage potential associated with protecting a permanently shutdown site. To accomplish this, we will review existing regulations in 10 CFR 73.55 and determined what requirements are necessary for a permanently shutdown power reactor. By analyzing the security areas that need to be protected, we will eliminate those requirements that are beyond the protection strategy needed for a permanently shutdown power reactor site and its capability to preclude a radiological release that could impact public health and safety.

6.7.3 Open Issues

As noted above, this new regulation will be very similar to 10 CFR 73.51 with the major exceptions the use of armed security officers, off-site bullet resisting alarm station, and the retention of the vehicle barrier system. The following additional open or unresolved issues will be resolved during the formal rulemaking process. Several of those issues are as follows: (1) the impact of the this technical study as it relates to timing of the downgrading of requirements; (2) grandfathering those sites that defueled prior to vehicle barrier system rule; (3)and the use of vital and protected areas as currently defined in the regulations.

6.8 Worker Safety During Normal Decommissioning Operations

The nature of the radiological hazards that workers are subjected to during decommissioning a nuclear power plant is not significantly different than those encountered during major maintenance activities (i.e., steam generator replacement, etc.) at an operating plant. The scope of the work (in terms of number of contaminated systems, volumes of radioactive materials, etc) can be significantly larger. However, the programs and procedures established during plant licensing and operation would, in general, be capable of ensuring worker safety and compliance with the requirements in 10 CFR Part 20. During the course of decommissioning, it is expected that the size of the radiation protection program (i.e., number of Health Physics (HP) staff, etc.) would vary commensurate with the scope of decommissioning activities. As the dismantling of systems is completed and the sources of radiation are removed from site or placed in shielded storage, the resources invested in HP be reduced. During the time frame that SFP drain down (with potential for a zirconium fire) is of concern, the numbers of staff and resources needed for decommissioning would be sufficient to support mitigating the SPF event.

6.9 Summary for Normal Decommissioning Operations

The above subsections have discussed some of the regulations that continue to apply during the decommissioning. Several of the areas, such as quality assurance and maintenance rule, have been identified in preliminary regulatory review initiative as areas that would benefit from clarification for decommissioning plants.

From this review of normal operations, we conclude that the actions from Bulletin 94-01 should be verified and maintained for all decommissioning plants.