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September 5, 2007

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Draft 2007-12 Strategic Plan: Public Comment

Re: The NRC encourages all interested parties to comment on the draft Strategic Plan. The comment period ends September 7, 2007. Comments on the draft plan are to be submitted in electronic format (Microsoft Word) using e-mail to: StratPlan@nrc.gov or mailed to Chief, Rules and Directives Branch, mail Stop T6-D59, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; or faxed to: Chief, Rules and Directives Branch at (301) 415-5144

Ref: Submittal Comments August 14, 2007 (minor changes and additions; typo corrections)

Summary:

Nuclear regulation should take advantage of new technologies – including information management – to improve productively, safety and realize other benefits. The strategic plan should boldly capture the highest aspirations of the nuclear industry to better realize its intrinsic strengths – safety, technology and people. Advancing a risk-informed, performance-based regulatory framework should support the nuclear industry with new initiatives that develop actionable, risk-informed, performance based operations. The industry should address historical weaknesses – undue dependence on traditional hardcopy paper, complexity, slowness to embrace proven technologies, and licensees who seek NRC direction before attempting low risk innovations or other beneficial improvements. The nuclear industry should strive to find a legitimate home for cost consideration in the risk-informed framework, so that end-users – the public – realize maximum benefits from new nuclear technology and regulation.

Dear reviewer:

Please consider the following summarized strategic plan recommendations. Their intent is to increase NRC's strategic plan clarity, and directly improve the safety and economic viability of the next generation of new nuclear plants. *Blue italics* identify source document reference excerpts.

In the next five years, the Nation is likely to see the following changes occur:

(add) Data management capabilities and relational data model understanding will improve as relational database technology and paper documentation systems migrate into data-centric formats, modes and software methods to replace paper. Practically, it will become more difficult to maintain large plant design bases without comprehensive, relational electronic media like computer-networked file server databases. *Basis*: Advances in relational database technology and design, combined with file server networks have made traditional paper-based systems obsolete. Continued paper-based systems use as a primary source of data will lead to data errors with potentially serious safety consequences.

Changes in the regulatory environment also require that the agency's human capital planning includes provisions for knowledge management (capture, documentation and transfer),

(note) With the same labor market pool, labor productivity will be critical. There will be less available labor to waste on inefficient processes or design models.

Safety Goal Strategies

1. Develop, maintain, and implement licensing and regulatory programs for reactors, fuel facilities, materials users, spent fuel management, uranium recovery, decommissioning and waste-related activities to ensure the protection of public health, safety, and the environment.

(note) Reactors regulatory programs will require more efficient use of resources to improve programs with fewer available personnel. Reactor regulatory program development should strive to simplify, clarify and streamline complex programs like those for Appendix B deterministic licensing SSC treatment requirements.

2. Prepare for and manage the review of applications for new power reactors while continuing to ensure the safe operation of existing plants.

(note) New power reactor licensing needs to become more comprehensive and faster at the same time. Methods like standardization and repetitive work use will need to do more with less. Lessons learned from new interest areas like new reactor licensing should be used to improve existing fleet programs.

5. Use sound science and state-of-the-art methods to establish risk-informed and, where appropriate, performance-based regulations.

(add) Assist licensees develop simple actionable methods that implement risk-informed, performance based regulations.

(note) Using other similar consensus process standards, like the FAA-endorsed Air Transport Associations (ATA)'s MSG-3, Operator/Manufacturer Scheduled Maintenance Development, and industry experience. NRC should attempt to extend and simplify current regulations. The MSG-3 significance is providing FAA-endorsed consensus, actionable guidance to implement risk-based maintenance plan development for the airline industry.

8. Oversee licensee safety performance through inspections, investigations, enforcement, and performance assessment activities.

Use oversight operations to assist licensees develop better, more actionable risk-informed methods. Basis: Current guidance is very confusing and complex for licensees. Ideally, risk-informed methods should translate into transparent actionable methods that licensee personnel can use to implement risk-informed regulations.

Means to Support Safety Strategies

Use sound science and state-of-the-art methods to establish risk-informed and, where appropriate, performance-based regulations.

NRC policy should investigate and apply similar programs in other high-risk, regulated industries and the most advanced technologies available, where they have already been developed and are shown to be effective.

Developing better regulatory risk structures to access and compare risk-informed equipment classifications, and relate those back to design would more-openly identify concerns that could pose safety risk. Portraying these in objective risk formats ("will cause xxx.yyy% increase...") versus speculative format ("might cause", or "could cause" ...) should become a licensee communications operational goal.

Risk-informed regulatory approaches lack the simple safety-related/non safety related dichotomy of traditional deterministic licensing. To complete SSC classification, other organizations (NEI, INPO, ASME...).have attempted to fill gaps left when rules like 50.69, 50.65, or even traditional Part 50 Appendix A & B exclude the discussion of balance of plant equipment in risk considerations. INPO created critical equipment attempting to fill that gap. The Maintenance Rule applies risk to equipment lacking direct single failure safety threat in recognition of multiple failure event possibility. The upshot is SSC classification schemes that elevate much equipment into safety-related (or safety-significant) SSC classification on the basis of multiple failures. For traditionally non-safety related equipment, this places more equipment under the Maintenance Rule coverage, on the basis it could change the Power Output schedule planned for the facility in multiple failures. For procurements, this increases the number of SSC that must meet full 10CFR50 A&B requirements under old licensing. While the availability of a full-scope

PRA corrects this situation, it only applies for new construction (which must have full PRA). Even new plant, full-scope PRAs rarely go below the SSC level into subassembly part internal failure events. Without part level PRA, all-encompassing, pervasive new plant SSC procurements prospects under Part 50 Appendix A & B (now Part 52) are very real. New plant procurements could become prohibitively expensive like the operating fleet's. NRC should look at other risk management frameworks, like those developed by the ATA[1] and endorsed by FAA[2] (MSG-3(4), "Scheduled Maintenance Development") to see what lessons learned could transfer to simplify nuclear risk management SSC categorization and treatments. Highly-redundant safety-critical applications need simple actionable guidance to categorize SSC and select special treatments. NRC should identify a framework whereby the new plant license holder can develop SSC internal event failure-mode identification to select special treatments, and confirm that this reduces simply to dedication practice – like that called for by 50.69, the IDP (Independent Decisions Panels). Finally, NRC should create a comprehensive list of SSC special treatments by type, placed in one location, for reference by designers and operator-maintainers so that they may readily assess SSC special treatment requirements available quickly based on safety classification.

At least three equipment risk categorizaton schemes compete with each other. Through consensus groups, NRC should encourage industry identifying a common schema that could be used simply, in conjunction with single point failure, to uniformly classify SSC safety risk. NRC should encourage the use of simple data structures that incorporate standardization into readily retrievable, consolidated formats. They should reduce SSC safety categorization (re)interpretation, while assessing safety function consequences to the lowest part subassembly level. Currently, Part 50 "dedication" process requires these steps. To improve consistency, operationalizing methods should be a practical implementation goal. Completed analysis should be retained in retrievable format for consistent reference.

Review licensing requests (e.g., new applications, amendments, renewals, decommissioning, termination) to confirm that they provide an adequate margin of safety and are consistent with regulatory requirements, and conduct environmental reviews, as appropriate, to ensure actions comply with the National Environmental Policy Act of 1970. [Supports Strategies 1 and 2]

Implement, review, and refine the Reactor Oversight Process,...

Maintain an environment in which safety issues and differing views can be openly identified without fear of retaliation. [Supports Strategies 1, 3, and 5]

NRC should encourage third party perspectives sharing licensee performance information. Contractors offer many insights into standard industry practices and specific licensee performance and practices. Soliciting candid opinions from contract organizations about license performance would also improve balance in licensee-subcontractor relationships, thereby encouraging more openness from contractors who may have performance concerns.

***Timeliness:** NRC decision making process is well reasoned, justified, and decisions are made in a timely fashion to ensure safety and security.*

Making information that supports decision-making more centrally available and accessible should improve access to critical information improving time to develop derivative information. NRC may want to consider closing the regulatory loop for those submitting recommendations or changes to rules, policies and procedures. Currently suggestions generally receive no feedback response to submitters'.

Operational Excellence Strategies

[1] Air Transport Association
[2] Federal Aviation Administration

4. Conduct the NRC's information technology and information management activities to improve the productivity, effectiveness and efficiency of agency programs and operations, and enhance the utility and accessibility of information for all users inside and outside the agency.

Advanced technologies that offer tested improvement to nuclear generation should be evaluated for transfer to stem obsolescence caused by regulatory inertia. Specifically, licensees are reluctant to try any new technology until they've been give NRC's green light. Thus many effective technologies like distributed control systems, or centrifugal or rotary air compressors that offer substantial improvements over their nuclear equivalents, remain to see widespread application in nuclear industry. For data management, licensees remain committed to text document systems for critical attribute data management at a time when other industries and agencies have started migration to more advanced relational structures. NRC should encourage licensees to take measured risks in non-safety areas to develop technologies that promise to improve long term nuclear safety. Information access today is largely through document titles and PDF files. Critical attributes should be mapped to a common data structure to speed and integrate the access and logical organization of design data by plant type.

Methods that implement risk-informed guidance such as 50.69 SSC, Risk-informed Categorization and Treatment of SSC, should be made more actionable by relating new risk-informed methods with historical deterministic guidelines ones. Some practices will remain essentially deterministic at their final implementation. In some cases, risk-informed implementation method (e.g., actionable method) remains yet to develop. Others have deterministic final steps. For example, the dedication procurement of subassembly parts under 10CFR50 A&B, "dedication," historically used a deterministic interpretation of the FSAR DBA safety events to identify ("dedicate") parts requirements subject to 10CFR50 A&B rules. This process will still to apply under 10CFR50.69; new plant designs will have to dedicate all parts below the SSC level of the most detailed PRA – or procure entire SSC generally to the same all encompassing 10CFR50 requirements across the board. The latter choice leaves the dedication decision process for the successful supplier bidder who accepts the procurement requisition specification, and gets a Purchase Order. In each case, detailed PRA can develop parts safety requirements to the component subassembly level, removing this need and specification development requirement. NRC processes should identify actionable methods that identify how licensees and/or their suppliers should comply with complex requirements – simply. In every case, both should take full advantage of the efficiencies offered by retaining completed analysis retrievably for future access and reuse on later work.

Standardization of designs should be considered for processes and information used in the nuclear industry. Operating experience remains highly dependent on source submitters, and is not available to the general public since the Institute of Nuclear Power Operations maintains the information. Industry failure data should be as available as NRC generic communications reports.

5. Use innovative strategies to recruit, develop, and retain diverse employees, and increase the diversity of employees in senior and managerial positions to achieve a high quality, diverse workforce.

So called Generation-X employees will expect more hot-linked and relationally tied information management tools that are more like advanced server applications on the web. The lack of new data management structures and continued dependence on documentation in PDF or other hardcopy files will place more workers in obsolete information management environments. This will place NRC at a disadvantage from an employee retention perspective. Furthermore, the nuclear industry follows NRC lead in information management practices. Industry organizations like NIRMA (Nuclear Information Records Management Association) remain firmly implanted in the use of microfiche and other obsolete technology in large part because of the continued nuclear operation organizations dependence on hard copy documentation. NRC should lead the way to develop better information structures because of its position in nuclear technology management.

NRC should encourage industry along the same path by creating innovative method to accomplish the same ends as formerly done by rote "nuking it out" methods. NRC should encourage more industry innovation to maintain a diverse, creative workforce. NRC might want to consider exchange programs with other

highly-technical, high risk regulatory agencies like DOE, DOD FAA, and FDA to share experiences and perspectives managing public risk.

7. Sustain a learning environment that provides continuing improvement in performance through knowledge management, performance feedback, training, coaching and mentoring.

Knowledge management will be the most pressing developmental area the NRC faces with resumption of reactor design, licensing and construction and the absence of substantial changes in the processes used to accomplish these activities since the last generation of power plants was constructed. Although Engineering CAD (Computer Aided Design) systems have gained tremendous power in the past two decades, their use ends at the development of designs. They don't allow only limited integration with the other structures on which they depend, like safety rules (10CFR50 A & B, for example). They neither allow operating entities economies of scale nor improved safety by integrating derivative systems like procurement specifications (which are based on high level design requirements' SSC components), scheduled maintenance and operations monitoring treatments, and tag out configuration controls. The lack of design basis integration is the single most critical nuclear plant design challenge today. Since TMI there has been a continued, regular occurrence of nuclear plants unintentionally operating outside their design basis (in ignorance) that can only be attributed to the complexities and finer nuances of nuclear plant configuration management. Data duplication and complexity tracing back to the design basis should be simplified to avoid loss of critical operating information.

9. Provide accurate, timely, and useful financial information to agency managers for effective decision-making.

While licensee financial controls are outside the direct purview of the NRC, continuing on a deregulation path, even if limited, operating nuclear plant's financial health needs to be assured. Under-funding nuclear plants could affect safety. To assure cost effectiveness and safety, NRC should encourage licensees to measure plant SSC level expenses, performance-basing all their financial cost-benefit metrics. This would assure plant expenses (or lack thereof) are measurable at system, train and even SSC level in meaningful ways to benchmark with comparable units and others. In short, in a competitive market NRC should encourage licensees to maintain the financial cost-benefit metrics that justify – and compare – all performance expenses.

***Selected Activities** to Support Operational Excellence*

Information Technology/Information Management

- *Improve information management processes, such as information dissemination and knowledge management. [Supports Strategies 3 and 4]*

  Standard plant designs selection should be complemented with the development of a standard licensing framework structured around networked, server-based relational data. The licensing of the design under the Combined Operating License could then be measured for degree of compliance to a standard, be it a Westinghouse AP-1000, GE ESBWR or other standard design approved under Part 52 with a Design Control Document. This would facilitate the simplification and standardization of reporting under 50.65, the maintenance rule, which is a significant nuclear plant/NRC staff manual personnel

burden. A standard design and format would facilitate automated data input of maintenance preventable function failures and system availability to assess performance.

- *Improve internal and external electronic information access and delivery systems. [Supports Strategies 3 and 4]*

  The integration of the critical attributes from fundamental licensing documents into a relationally linked form would provide the framework under which all information could be more readily accessed and used without the extensive experience requirements that new younger employees will lack. This will improve regulation and safety, while allowing more effective use of resources.

- *Systematically evaluate, improve, integrate, and automate selected regulatory and support processes from beginning to end, considering the needs of all process participants and using the most effective redesign approaches and technologies. [Supports Strategies 3 and 4]*

  New plant licensing should attempt to provide an integral framework on a per unit design basis that allows integration of all regulatory processes from beginning to end. This should anticipate aligning all design basis maintenance activities from beginning to end, from the initiation of design under the top level regulatory criteria to the final release of the site for unrestricted use after decommissioning, many years later. In between, it should cover all design updates, revisions to rules, codes and standards, equipment replacements, operating experience, and other requirements needed to both maintain the design basis and automatically generate all operating treatments – operating procedures, tag-outs, procurement specifications, scheduled maintenance requirements, SSC risk classification, and other critical operating information based upon critical design attributes that are relationally linked.

- *Apply information technology/information management (IT/IM) to meet high-priority business needs (e.g., new reactors, fuel cycle facilities, the high-level waste repository proceeding, homeland security). [Supports Strategies 3 and 4]*

  Automating the design cycle will improve not only licensee, but NRC regulatory and business needs for those programs deemed priorities by Congress and the President.

- *Seek common solutions, reduce duplication, and promote sharing of data, systems, and service components across the agency. [Supports Strategies 3 and 4]*

  By developing a common information management regulatory framework, NRC would achieve significant synergies of licensing while allowing separate unique designs to go forward where economics dictated. For example, a common framework would support PWR, BWR and MHRs (or any other new design, for that matter) within a common set of metrics that allow cross-comparisons of performance based on the fundamental design control document. This would allow NRC to quickly identify performance outliers by quickly screening irrelevant site specific design features to get to fundamental performance. Enhanced data tools will make the oversight process more transparent, and facilitate the movement into a more design data centric framework that is more flexible by tying performance information more directly into networked performance monitoring systems

- *Influence Federal initiatives that are applicable to the NRC and expeditiously adopt such IT solutions where they provide sufficient return on investment. [Supports Strategies 3 and 4]*

  Because many federal and state agencies, indeed whole industries grapple with similar information technology issues, yet lack the fundamental commitment framework of the nuclear industry, they can't be effective integrating uniform server-based critical attribute data systems. For example, both DOD and VA need methods to move medical records for critical injured defense personnel from forward areas to treatment facilities. Lacking critical attribute-based personnel injury records, treatment suffers. Agencies can't move hardcopy records with injured personal with certainty. Similar issues abound across the federal agencies like FDA, DOD (hardware), FBI, and NSA. Better data structure models elude network information designers for a variety of reasons, such as larger and more complex

frameworks. Nuclear industry records have commensurate complexity but intense public interest in their accuracy, quality and safety based upon the regulatory framework in which they reside.

- *Build shared services into the IT infrastructure to reduce costs of applications that require these services. [Supports Strategy 4]*

  Integration should begin at the design level with a common architecture and a goal to link in a common framework as experience is gained. Because efforts to link the entire design basis across all designs is so large, the first step should be at the individual design level within a common framework relational structure.

- *Expand and strengthen information security capabilities to ensure that effective information protection is in place, and develop and communicate policies regarding security. [Supports Strategy 4]*

  Developing a common framework, each Part 52 plant design could eventually move to an NRC – controlled server. At that point, access controls could allow the same data security structures to provide information access based upon need, but restricted for safeguards based upon the logon authority of the user. This could eventually to place most information where it is most accessible, useful but still controlled.

For clarifications or questions, please contact me at the location below, or by fax or email.

Sincerely,

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