ABSTRACT

The paper will explore the current challenges of financing the disposal costs for disposing of large reactor components such as reactor pressure vessel heads and steam generators and the resulting delays in disposal caused by the current regulatory requirements. The paper also will discuss a recent rulemaking petition submitted by EnergySolutions to the US Nuclear Regulatory Commission designed to improve the regulatory process by providing a process to permit funds from decommissioning trust funds to be used to fund disposal of large reactor components. If granted, the disposal of these large components could be expedited where reactor licensees have sufficient decommissioning trust funds available. Perspectives on the rulemaking will be addressed.

Introduction

In the United States approximately 200 steam generators and other major reactor components (MRCs) have been removed from service at nuclear power plants. These MRCs could be disposed of in licensed disposal sites (there is capacity at disposal sites to dispose of these and other MRCs that contain low-level waste classified under 10 CFR Part 61 as Class A waste). However, most of these steam generators remain stored on reactor sites in specially constructed structures rather than being disposed of at licensed disposal sites. This situation occurs in large part because licensees are unable to fund disposal using decommissioning trust funds, which were collected in part to provide for the disposal of these components. Current regulations of the United States Nuclear Regulatory Commission (NRC) only allow decommissioning trust funds to be used following cessation of operations. (NRC regulations in 10 C.F.R. 50.82 (a)(8) permit withdrawals only for planning activities prior to the submittal of the post-shutdown decommissioning activities report.)

Consequently, rather than use limited operating funds, most licensees defer the disposal of the MRCs until the time of decommissioning, when the disposal clearly will be part of decommissioning and the cost of disposal will be paid from the licensees’ decommissioning trust...
funds. Without a change to the NRC regulations or the granting of case-by-case exemptions, these contaminated components may remain stored on sites for decades. Moreover, if future steam generators need to be removed, new storage buildings will need to be built. And at the time of decommissioning, the decommissioning of these storage buildings will add to the cost of decommissioning. License extensions exacerbate these issues.

On May 29, 2007, EnergySolutions (Petitioner) submitted a rulemaking petition (Petition) to the NRC to provide a process in the NRC regulations to permit a licensee use decommissioning trust funds to dispose of MRCs prior to ceasing operation at a site. Early disposal of MRCs offers several advantages, including:

1. The radioactive source term associated with the contaminated components at reactor sites will be reduced,
2. The site workers will be exposed to less radiation,
3. Unnecessary regulatory burdens can be eliminated as the costs associated with maintaining the components on-sites and providing protection to the workers as a result of those components can be avoided,
4. The overall costs to decommission sites will be reduced, and
5. More funds will be available to decommission reactors at the time the reactors cease operation.

This paper discusses the Petition and public comments submitted on the Petition. NRC has not yet discussed its views on the Petition or had a public meeting on the Petition. Thus its position on the Petition is unknown. NRC noticed the Petition for public comment on August 21, 2007 (72 FR 46569) and provided a 75 day comment period. As of the date this paper was submitted six comments had been submitted to the NRC. In addition, one licensee, STP Nuclear Operating Company, on September 19, 2007 submitted an exemption request to the NRC to permit it to use decommissioning trust funds for the disposal of several MRCs in advance of NRC acting on the Petition.

It is recognized that the Petitioner has a financial interest in having MRCs disposed of at its Clive facility in Utah. However, the Petition noted that after discussions with individuals in the nuclear industry and based on the knowledge and experience of EnergySolutions’ employees, the Petitioner submitted the Petition on its own behalf as it has concluded that it is in the public interest to dispose of MRCs prior to cessation of operations. Granting this Petition simplifies future decommissioning, reduce source terms, and provide flexibility for licensees to better use limited land areas on licensed sites.

It should also be recognized at the outset that the rule proposed by the Petitioner and discussed below may not work for all licensees. However, where a licensee has sufficient funds available in its decommissioning trust funds to cover decommissioning consistent with 10 C.F.R. 50.82(a)(8)(i)(B)-(C), it should be allowed to withdraw funds from the decommissioning trust funds to dispose of MRCs. As a result, the potential health and safety risk to site workers will be decreased as significant source terms are removed from sites and properly disposed of decades in advance of the time the MRCs would have been removed if licensees waited until their reactor ceases operation. In addition, as a result of the escalating cost of disposal, using funds now for
disposal would improve the ability of the remaining decommissioning trust funds to cover the costs for the remainder of decommissioning activities at the time the reactor ceases operation.

**Current Regulatory Language**

Current NRC regulations provide in 10 C.F.R. 50.82(a)(8)(i) that decommissioning trust funds may be used by licensees if

(A) The withdrawals are for expenses for legitimate decommissioning activities consistent with the definition of decommissioning in section 50.2;

(B) The expenditure would not reduce the value of the decommissioning trust below an amount necessary to place and maintain the reactor in a safe storage condition if unforeseen conditions or expenses arise and;

(C) The withdrawals would not inhibit the ability of the licensee to complete funding of any shortfalls in the decommissioning trust needed to ensure the availability of funds to ultimately release the site and terminate the license.

In addition, 10 C.F.R. 50.82(a)(8)(ii) provides a limitation on use of decommissioning trust funds prior to the submittal of a PSDAR. Specifically:

(ii) Initially, 3 percent of the generic amount specified in section 50.75 may be used for decommissioning planning. For licensees that have submitted the certifications required under section 50.82(a)(1) and commencing 90 days after the NRC has received the PSDAR, an additional 20 percent may be used. A site-specific decommissioning cost estimate must be submitted to the NRC prior to the licensee using any funding in excess of these amounts.

**Petition’s Proposed Regulatory Language**

The Petition proposes amending 10 C.F.R. 50.82(a)(8) to add a new paragraph as section 50.82(a)(8)(iii) that would provide a process for NRC to allow funds to be withdrawn from decommissioning trust funds for the purpose of disposal of MRCs. The new paragraph would read as follows:

(iii) Notwithstanding the limitations of sections 50.82(a)(8)(i)(A) and (ii), a licensee may use decommissioning trust funds to dispose of major radioactive components that have been removed from the reactor provided:

A. The licensee has submitted to the NRC with a copy to the Federal or State Government agency (e.g., Federal Energy Regulatory Commission and State Public Utility Commissions), if any, with rate regulation oversight responsibility for the licensee’s decommissioning trust fund:

(1) a request to allow it to withdraw a specified amount from its decommissioning trust fund for the purpose of disposing of specific major radioactive component(s);

(2) a site-specific decommissioning cost estimate that includes the disposal costs for major components stored on site; and

(3) an analysis demonstrating that if the licensee withdraws funds for the costs of disposing of the particular component(s) from the decommissioning trust fund, the
remaining funds in the licensee’s decommissioning trust fund are sufficient to meet the provisions of sections 50.82(a)(8)(i)(B) and (C); and

B. The NRC has concluded that there is reasonable assurance that the provisions of sections 50.82(a)(8)(B) and (C) will be met if the licensee withdraws the funds requested under section 50.82(a)(8)(iii)(A)(1).

The MRCs addressed by the Petition are those components defined by the NRC at 10 CFR 50.2 as “major radioactive components.” Specifically these are the reactor vessel and internals, steam generators, pressurizers, large bore reactor coolant system piping, and other large components that are radioactive to a comparable degree.

**Basis for the Petition**

The Commission in the Statements of Consideration for the 1996 amendments to 10 C.F.R. 50.82 in responding to a comment stated that “allowing decommissioning trust funds withdrawals for disposals by nuclear power plants that continue to operate is not warranted. These activities are more appropriately considered operating activities and should be financed that way.” 61 FR 39278, 39293 (July 29, 1996). Consequently, licensees, having been precluded from using decommissioning trust funds, have found it preferable to store large components on site rather than expend limited operating funds to dispose of these components. However, the MRCs at issue here, consistent with the definitions in 10 C.F.R. 50.2, are “major radioactive components,” the dismantlement of which the NRC did not consider to be “routine operations.” 61 FR at 39286. Furthermore, the components considered to be “routine nuclear power reactor operation activities” were components not within the definition of “major radioactive components.” Id. The MRCs which are the subject of this Petition were originally intended to be used for the life of the plant. Thus, as expressed in the petition, the Petitioner believes that the disposals of MRCs are appropriately funded from decommissioning funds and are not operating expenses.

By deferring the disposal of the MRCs until the time of decommissioning, the disposal clearly becomes part of decommissioning, and the cost of disposal will be paid from the decommissioning trust fund (MRCs will need to be removed from the site and disposed of to achieve the dose limits of the License Termination Rule, 10 C.F.R. Part 20, Subpart E). The result has been that licensees have delayed disposal of over 100 steam generators, instead storing them onsite in specially constructed mausoleums. In addition to the costs to build these structures, licensees are required to expend funds for maintenance of the structures, environmental monitoring (in light of the potential contamination associated with the MRCs), and ultimately the cost of disposing of the mausoleums themselves.

The Petitioner considers the disposal of the MRCs to be a decommissioning activity because the activity can be described as removal from service of MRCs that are large items of capital equipment. The NRC definition of “decommission” implies the entire facility must be removed from service as a prerequisite to consider an activity a legitimate decommissioning activity. 10 C.F.R. 50.2. When the NRC promulgated the decommissioning rule in 1988, it noted in the Statements of Consideration to the final rule that “[d]ecommissioning activities are initiated when a licensee decides to terminate licensed activities.” 53 FR 24,018, 24,019 (June 27, 1988). The MRCs that are covered by the Petition have already been removed from service but await disposal. Absent a rule amendment or an exemption, the current regulations encourage licensees,
as noted above, to delay disposal of the MRCs until the facility ceases operation. Accordingly, in order to use decommissioning trust funds for disposal of MRCs an amendment with respect to 10 C.F.R. 50.82(a)(8)(i)(A) is needed because the facility and site are not being removed from service and therefore under the definition of “decommission” the disposal activity requested to be paid from the decommissioning trust fund is not a “decommissioning activity.” As explained below, granting this Petition will not result in creating a situation where there will be insufficient funds to fully decommission the Facility.

**Reasons Why the Petition Should Be Granted**

This Petitioner provided seven reasons why the Petition should be granted.

**Granting this Petition is Consistent With the Purpose of the Rule**

The underlying purpose of 10 C.F.R. 50.82(a)(8) is to provide adequate funds for ultimate decommissioning of the site. The purpose of the restrictions on fund withdrawal is to protect the health and safety of the public by assuring that there will be adequate funds available to complete the NRC-required decommissioning activities following termination of the operating license. NRC’s current regulatory approach – a blanket prohibition on the use of decommissioning trust funds to dispose of MRCs – is unnecessary to achieve the underlying purpose of the rule. The amended rule would require a current site-specific decommissioning cost estimate to be submitted to the NRC and a demonstration that the decommissioning trust fund is adequate to complete decommissioning even if funds are withdrawn for early disposal of the MRCs. The licensee’s analysis would be required to demonstrate that 10 C.F.R. 50.82(a)(8)(i)(B) and (C) are met. Specifically:

- (B) The expenditure would not reduce the value of the decommissioning trust below an amount necessary to place and maintain the reactor in a safe storage condition if unforeseen conditions or expenses arise and;
- (C) The withdrawals would not inhibit the ability of the licensee to complete funding of any shortfalls in the decommissioning trust needed to ensure the availability of funds to ultimately release the site and terminate the license.

Importantly, under the proposed amendment, the NRC would not only have received the licensee’s site-specific decommissioning cost estimate, NRC would need to make a finding that there was reasonable assurance that the provisions of 50.82(a)(8)(B) and (C) will be met if the licensee withdraws the requested funds. In addition, before making that finding, the NRC would be able to consider, although not be bound by, the views of the appropriate Federal or State agency, if any, with oversight responsibility for the licensee’s decommissioning trust fund. Thus, this amendment does not diminish the assurance that adequate funds will be available for ultimate decommissioning of the site based on a site-specific analysis consistent with the purpose of the rule.

**Granting this Petition Avoids a Conflict with the NRC Philosophy Underlying Other Rules**

Application of the regulations in 10 C.F.R. 50.82(a) is in conflict with the philosophy underlying the approach the Commission has taken for timeliness requirements set up for materials licensees. Material licensees of the NRC are subject to the 1994 Decommission Timeliness Rule, 10 C.F.R. 30.36, 40.42, 70.38, and 72.54, which requires those licensees to decontaminate and decommission certain unused portions of operating nuclear materials facilities. Allowing contaminated land, buildings or equipment to remain on-site was seen as a possible public and
environmental liability and the Commission looked for ways to achieve early decommissioning of unused portions of materials facilities. For valid and sound reasons, reactor licensees are not subject to this rule and, in fact, are allowed the SAFSTOR option under 10 CFR 50.82. Nevertheless, NRC should not create economic barriers for the reactor licensees who seek to make prudent decisions to remove source terms from their sites.

In addition, application of the regulations in 10 C.F.R. 50.82(a) is in conflict with the philosophy underlying the approach the Commission took for the license termination rule in modifications to its regulations in 1997. NRC added 10 CFR 20.1406 which reads:

Applicants for licenses, other than renewals, after August 20, 1997, shall describe in the application how facility design and procedures for operation will minimize, to the extent practicable, contamination of the facility and the environment, facilitate eventual decommissioning, and minimize to the extent practicable, the generation of radioactive waste.

The intent of 10 CFR 20.1406 is to diminish the occurrence and severity of site contamination by taking measures that will control contamination and facilitate eventual decommissioning. Consistent with this philosophy, early disposal of large components would comply with the Commission’s intent under 10 CFR 20.1406.

Nuclear reactor licensees, though not required to do so, should be permitted to utilize decommissioning trust funds that are intended to cover the removal expense in advance of cessation of operations when such components no longer have a useful purpose. Early disposal could take advantage of the current favorable disposal pricing in some cases. However, without a rule amendment or an exemption from the rule, such items could remain on-site for additional decades, particularly given current trends towards license renewal. Moreover, delaying disposal will likely escalate disposal costs given past experience.

**Withdrawals Under This Petition Would be Permitted Only For Limited Activities**

The requested amendment would only allow withdrawn funds to be used for the disposal of MRCs and associated costs such as preparation for and transportation to the disposal site. It is limited to “major radioactive components” that were expected at the time of initial licensing to last the life of the plant. These are the types of components that would clearly be covered as “legitimate decommissioning activities” if they remained on-site until the reactor ceased operation. The proposed amendment does not apply to valves, pumps, and other components that at the time of initial licensing had the clear potential for replacement during operations. Consequently, granting this rulemaking Petition does not create a “slippery slope” that may result in increased pressure to pay for ordinary operating expenditures with decommissioning trust funds.

**The Proposed Amendment Does Not Depend on the Adequacy of the Minimum Funding Requirement in 10 C.F.R. 50.75**

Some questions have been raised regarding the sufficiency of decommissioning trust funds based on the formula amount set forth in 10 C.F.R. 50.75(c). Both the NRC Inspector General and the Government Accountability Office (GAO) have raised questions about the adequacy of some decommissioning trust funds. *Nuclear Regulation: NRC Needs More Effective Analysis to Ensure Accumulation of Funds to Decommission Nuclear Power Plants, GAO-04-032 (October 2003)*. However, as noted above, before funds can be withdrawn under the proposed
amendment, the licensee will need to submit 1) a site-specific decommissioning cost estimate and 2) a demonstration of the adequacy of the amount of funds in the decommissioning trust fund. It would be expected that the licensee’s analysis for this demonstration would address factors such as:

1) the status of the decommissioning trust fund including the amount of current funds, a comparison of the current funds in the decommissioning trust fund to the site specific decommissioning cost estimate, the fund performance in relation to the 2% earning rate set forth in 10 C.F.R. 50.75, the status of ongoing contributions, and the time available to accumulate additional funds;

2) the comprehensiveness of the site-specific decommissioning cost estimate including the basis for concluding that the licensee understands the elements impacting the cost for decommissioning and the estimate comprehensively addresses these elements; and

3) the reliability of the decommissioning cost estimate including how the site-specific decommissioning cost estimate factored in the lessons learned from recent reactor decommissioning cases.

The NRC would then need to make a finding that it has reasonable assurance concerning the adequacy of the funds. Thus, current concerns about the formula funding requirement in 10 C.F.R. 50.75 should not affect the consideration of this rulemaking petition.

Using Decommissioning Trust Funds Now To Dispose of MRCs At A Site Will Likely Result In More Funds Available To Decommission The Remainder Of That Site

A review of NUREG-1307, “Report on Waste Burial Charges” (February 2007) demonstrates that the cost of disposal is increasing. Historically, the cost of disposal has risen at a rate much higher than the 2% rate of return allowed to be assumed by 10 C.F.R. 50.75. By disposing of MRCs that are now being stored on a site, the overall cost of decommissioning the site will be reduced since that activity is already completed. As a result, disposing of MRCs now is equivalent to adding funds to cover future decommissioning expenses. In addition, permitting the use of the funds now removes the potential that future disposal costs for MRCs may go up more than currently anticipated. Thus, allowing the release of funds under the process proposed under the Petition actually provides additional assurance that the trust fund will remain viable at the time of decommissioning. Moreover, this assurance should increase the longer the period of time for fund accumulation. License extensions, therefore, should contribute to the added assurance. While the importance of these factors would vary from case-to-case, the process established by the Petition would require each licensee to make the economic demonstration for the particular site.

Granting this Petition Improves Site Safety and Prevents Potential Environmental Impact

Granting this Petition will provide for a regulatory framework that will encourage licensees to remove MRCs from sites for disposal resulting in increased protection to the public health and safety. Such disposal would occur decades in advance of the time they would otherwise be removed if the sites waited until the reactors cease operation. Prompt disposal by removing large source terms created by the contamination in these MRCs furthers the objective of maintaining radiation exposures as low as reasonably achievable (ALARA) pursuant to 10 C.F.R. 20.1101(b) by minimizing the potential for long-term exposure. This is a clear safety benefit that can be implemented now as there is disposal capacity for these MRCs. In addition, disposing of waste
prior to the permanent cessation of operations is consistent with the NRC policy to minimize the costs and complexity of decommissioning, also contributing to improved safety at the site.

The authors do not wish to imply that there currently is a problem with the storage onsite of MRCs. Licensees have proven that they are capable of managing the storage of this waste with minimal impact to health and safety and it is clear that the MRCs currently stored on sites have been properly managed. However, if not properly managed, these contaminated components have the potential to give rise to adverse environmental impacts. Early removal avoids any potential environmental impact from storing these MRCs on sites and permits other uses of the land used for storage and the storage buildings.

Granting This Petition Would Prevent Unnecessary Regulatory Burdens

Granting this Petition will remove an unnecessary regulatory burden from licensees who have had to store MRCs on their sites due to their inability to use decommissioning trust funds.

To store these MRCs on sites, licensees have had to build large, dedicated structures to avoid spreading environmental contamination associated with storage of contaminated MRCs and to reduce exposures to workers. In addition to the costs associated with building these structures, which can cost over a million dollars, there are operational costs for maintenance and monitoring potential worker exposure. In addition, these structures take up limited site space within restricted areas that may reduce operational as well as decommissioning flexibility. Also, these structures will eventually need to be decommissioned. These costs are unnecessary from a health and safety perspective if the licensee has sufficient funds in its decommissioning trust funds to meet the provisions of 10 C.F.R. 50.82(a)(8)(i)(B) and (C). Moreover, the current regulatory process causes licensees to use operating funds to build and maintain mausoleums and monitor releases in order to store these MRCs on site rather than to use decommissioning trust funds that were collected to cover the costs of disposing of them.

It should also be noted that the objective of the Petition conceivably could be met by isolating funds for MRC disposal in a sub-account within the decommissioning trust fund. Unfortunately, this option is not always feasible, or even available. In many cases licensees commingle the funds for the NRC-jurisdictional decommissioning and the non-NRC jurisdictional decommissioning in their decommissioning trust funds. Under the current regulatory framework in section 50.82(a)(8), the NRC regulations restrict the withdrawal of funds for a non-radiological activity because in the absence of sub-accounts these funds are commingled with the NRC-required funds in the decommissioning trust fund. Preventing the use of those funds solely because they are commingled creates an unnecessary regulatory burden as it does not have a corresponding safety benefit if the licensee has sufficient funds in its decommissioning trust funds to meet the provisions of 10 C.F.R. 50.82(a)(8)(i)(B) and (C).

Thus, granting the Petition will provide a process that will encourage early disposal and allow licensees with adequate decommissioning trust funds to avoid an unnecessary regulatory burden.

Public Comments on the Petition

Six comments were filed, all in support of the rule. Comments were filed by Nuclear Energy Institute, a consulting firm, and utilities and reactor owners. The commenters addressed the need for economic flexibility in making disposal decisions without impacting safety, reduced unnecessary regulatory burdens, reducing site source terms and worker exposure, potential to reduce the overall cost for decommissioning, avoid the need to expand funds for constructing
and maintaining storage facilities, and allow use of land taken up by storage facilities. One commenter, while supportive of the rule, viewed the Petition as potentially overly conservative in light of license extensions that have been and likely in the future to be granted. Consequently, the commenter suggested that NRC consider if there is more than 20 years left on the license for the collection of decommissioning funds, then the licensee could use the funds for disposal of MRCs with prior NRC notice but not approval. Twenty years, in the commenter’s view, should provide sufficient time to make adjustments to the decommissioning trust funds if necessary.

**Exemption Request**

As noted above, on September 19, 2007, STP Nuclear Operating Company (STPNOC) submitted an exemption to allow the use of up to $20 million per unit to pay for the disposal of MRCs involving reactor pressure vessel heads and stream generators. In seeking this exemption STPNOC noted that

The cost of disposal of these MRCs is included in the site-specific decommissioning cost estimates for the Facility, and funds are being accumulated in the NDTs to cover these costs. If approved, this exemption will facilitate the prompt removal of radiologically contaminated material from the Facility, reduce overall decommissioning costs, and reduce unnecessary regulatory burdens on the STP Owners associated with maintaining the MRCs on-site.

STNOC submitted this exemption in advance of the resolution of the Petition as it is facing a decision to build a new storage facility as the result of the need to replace the reactor pressure vessel heads. STPNOC asked NRC to reach a decision on its exemption request by July 1, 2008 in order for STPNOC to be able to construct the storage facility, if necessary, before its next outage.

In the authors’ view, STPNOC presents a compelling economic argument as to why it has sufficient decommissioning trust funds based on a site-specific decommissioning cost estimate to meet NRC requirements even if the funds are removed to address the disposal of the MRCs. The NRC treatment of this exemption request given its merits will likely be a bellwether of what NRC will do on the Petition.

**Conclusion**

NRC should provide serious consideration to this Petition. There is support in the industry for granting this Petition. As of the date this paper was submitted, there have been no negative comments. Granting this Petition is prudent and consistent with the underlying purpose of 10 C.F.R. 50.82(a)(8) and 10 CFR 20.1406. It provides flexibility without any adverse impact on the public health and safety. It should facilitate the decommissioning process by providing a regulatory framework to allow removing MRCs from sites, resulting in (1) the source term at the site being reduced, (2) the site workers being exposed to less radiation, (3) eliminating an unnecessary regulatory burden as the costs associated with maintaining the MRCs on-site and providing protection to the workers as a result of those components can be avoided, (4) the overall cost to decommission the site being reduced, and (5) more funds being made available to decommission the reactor at the time the reactor ceases operation. Finally, the framework would provide the demonstration by a site-specific decommissioning cost estimate and the associated funding program that adequate funds are available to dispose of these components as well as complete site decommissioning for unrestricted release consistent with the NRC requirements.
References

2. Decommissioning of Nuclear Reactors, 50.82, 61 FR 39278 (July 29, 1996)
3. Nuclear Regulation: NRC Needs More Effective Analysis to Ensure Accumulation of Funds to Decommission Nuclear Power Plants, GAO-04-032 (October 2003)
4. EnergySolutions’ Petition for Rulemaking to Amend 10 CFR 50.82 (May 29, 2007)
6. STP Nuclear Operating Company’s Request for Exemptions From 10 CFR 50.82 (September 19, 2007)
7. Comments of Duke Energy on PRM-50-88, Petition for Rulemaking on Disposal of Major
   Reactor Components (72 FR46569, August 21, 2007), submitted September 21, 2007
8. Comments of First Energy on PRM-50-88, Petition for Rulemaking on Disposal of Major
   Reactor Components (72FR46569, August 21,2007), submitted on November 1, 2007
9. Response of Exelon Nuclear to Request for Comments on PRM-50-88, submitted on
   November 2, 2007
10. Comments of NEI on PRM-50-88 - Energy Solutions Petition for Rulemaking, 72 Federal
    Register 46569, August 21, 2007, submitted November 5, 2007
11. Comments of STARS on Energy Solutions: Receipt of Petition for Rulemaking Regarding
    Use of Decommissioning Trust Funds (72 FR 46569), submitted on November 5, 2007
12. Comments of Talisman International on PRM-50-88, Petition for Rulemaking on Disposal
    of Major Reactor Components (72 FR46569, August 21, 2007), submitted on November 5, 2007