

**NRC STAFF RESPONSE TO COMMENTS RECEIVED ON THE NRC'S
ACCIDENT TOLERANT FUEL PROJECT PLAN DURING THE PUBLIC COMMENT PERIOD**

Comment #	Commenter	Comment	Proposed Resolution by Commenter	NRC Staff Response
1	Donald Desrosiers	Using a molten fuel injected into a reactor core heat exchanger designed to be molten as the maximum temperature possible for its purity and shape. When the cooling fluid flows to steam through the heat exchanger the temperature would drop leaving a partly molten or solid mass in the reactor. With disruption if coolant fuel would become molten again for an easy purge from the reactor core stored in a container designed to change the shape and cross section if the fuel that it solidifies with a much lower storage temperature. Initial injection and reinjection after core purge will require fuel to be heated to specific molten injection temperature.		This comment does not directly pertain to the draft ATF project plan. It has been provided to the advanced reactor group in the Office of New Reactors for consideration.
2	DOE	Commitment to working together		NRC staff recognizes DOE's commitment to continued strong coordination with regard to ATF.
3	Anonymous	The Draft ATF Project Plan and associated Memorandum of Understanding (MOU) between the NRC and U.S. Department of Energy (DOE) are in conflict with NRC independence under the Energy Reorganization Act of 1974. There have been a number of fully-closed meetings between DOE, reactor licensees, and the NRC, over a period of years, prior to issuance of the MOU (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17130A815). The public has had no opportunity to participate in or review the information subject to these closed meetings.		The terms outlined in the Memorandum of Understanding (MOU) between the NRC and U.S. Department of Energy (DOE) were examined to ensure they are not in conflict with NRC independence under the Energy Reorganization Act of 1974. NRC and DOE independence in cooperative programs are explicitly discussed in the implementing MOU (ML14072A366) in section V, "Principles of Cooperation," part (b), "General Guidelines for Cooperative Research Programs", which the

				document referenced in the comment is an addendum to. In addition, the staff has performed a review of all NRC sponsored meetings related to ATF and confirmed that they were conducted consistent with our internal agency processes outlined in Management Directive 3.5 "Attendance at NRC Staff-Sponsored Meetings."
4	Anonymous	Contrary to Assumption No.1 in the Draft ATF Project Plan, the NRC has an obligation to perform independent confirmatory analysis prior to any new materials (fuel or cladding) being introduced as lead test assemblies (LTAs) and/or proposed for use in batch loading. Commercial operating reactors are not licensed as research and test reactors for DOE.		LTAs have been used safely for decades by the nuclear industry. However, the staff understands the need to clarify the treatment of LTAs in the design and licensing bases of reactors and a separate NRC steering committee has been established to address the issue. The ATF project plan will be updated to acknowledge this and to clarify the scope of the plan.
5	Anonymous	The applicability of licensing processes is poorly defined in the Draft ATF Project Plan. The items in Task 1 and Task 3 neglect any discussion of amendments that may be required in accordance with 10 CFR 50.36 and 10 CFR 50.90. Contrary to licensing-avoidance strategy implicit in the Draft ATF Project Plan, any new materials other than Zircaloy and ZIRLO cladding and UO2 fuel require prior NRC approval in accordance with the regulations and licensee technical specifications.		Existing agency processes, such as fuel design topical reports and license amendments for batch loading of ATF designs, are outside the scope of the project plan. A statement in the draft plan was intended to communicate this and will be revised to enhance clarity. The purpose of the plan is to communicate how the agency will prepare for submission of ATF topical reports and license amendments, in order to minimize delays and increase efficiency of the review. These existing processes are already documented in many places. The project plan does not imply that license amendments and topical reports are not necessary for batch loading of ATF designs.

6	Anonymous	<p>The Draft ATF Project Plan does not address plant-specific licensing issues including revising the accident analysis in Chapter 15 of the Updated Final Safety Analysis Report (UFSAR), changes to instrument setpoints, use of NRC approved codes and methods, current licensed fuel limits less than or equal to 5% U-235 enrichment, issues related to changes in core reactivity and approved methods in the core operating limits report (COLR). For enrichments greater than 5% U-235, the regulations in 10 CFR 50.68 may require additional controls and criticality instrumentation and associated regulatory approvals.</p>		<p>Existing agency processes, such as fuel design topical reports and license amendments for batch loading of ATF designs, are outside the scope of the project plan. A statement in the draft plan was intended to communicate this and will be revised to enhance clarity. The purpose of the plan is to communicate how the agency will prepare for submission of ATF topical reports and license amendments, in order to minimize delays and increase efficiency of the review. These existing processes are already documented in many places. The regulatory framework for greater than 5% enrichment will need to be examined if vendors indicate a desire to do so. Exemptions and/or rulemaking activities will need to be identified following the concept specific phenomena identification and ranking table exercises.</p>
7	Anonymous	<p>The regulatory evaluation in Task 1 of the Draft ATF Project Plan seems to presume all operating reactors are licensed based on 10 CFR 50, Appendix A, "General Design Criteria [GDC]." Approximately 40% of the U.S. operating reactors are licensed before the GDC and are commonly referred to as "non-GDC plants." The Draft ATF Project Plan does not state what emergency core cooling system (ECCS) acceptance criteria will be used by the NRC for non-GDC plants, if 10 CFR 50.46 is not useful as a means of satisfying GDC 35.</p>		<p>ATF use in non-GDC plants will need to be assessed based on each plant's design criteria. As this is a plant-specific activity, going into detail in the project plan would be premature. This will be clarified in the plan the first time the GDCs are mentioned.</p>

8	Anonymous	The regulations in 10 CFR 50.46 are explicit in stating that use of materials other than zircaloy or ZIRLO cladding and UO2 fuel , requires an exemption to be put in reactors with zircaloy or ZIRLO cladding and UO2 fuel. The Draft ATF Project plan should be more explicit in providing guidance on the expectation for exemptions for all material combinations other than zircaloy and ZIRLO cladding and UO2 fuel.		10 CFR 50.46 describes the acceptance criteria whereby plants using zircaloy or ZIRLO cladding and UO2 fuel can meet the criteria in GDC-35. If a licensee wishes to apply this acceptance criteria to ATF they may need to request an exemption and show that the criteria apply to the fuel in question. Otherwise, licensees may demonstrate compliance with GDC-35 through an alternative means. No changes were made to the plan based on this comment.
9	Anonymous	Explicit discussion of topical report reviews is lacking in the Draft ATF Project Plan. The Draft ATF Project Plan should provide for explicit NRC review the results of research in topical reports for each cladding and fuel variation. NRC should issue independent safety evaluations on those topical reports prior to approval of batch loading of ATF fuel. This is especially important if any research and/or associated topical reports are used as a basis to propose new coping times for time-to-core-damage.		Existing agency processes, such as fuel design topical reports and license amendments for batch loading of ATF designs, are outside the scope of the project plan. A statement in the draft plan was intended to communicate this and will be revised to enhance clarity. The purpose of the plan is to communicate how the agency will prepare for submission of ATF topical reports and license amendments in order to minimize delays and increase efficiency of the review. These existing processes are already documented in many places.
10	Anonymous	In Task 1, the Draft ATF Project Plan appears to be biased toward crediting safety enhancements for fuel that is not yet demonstrated. It is not apparent that ATF fuel will perform as well as current operating reactor fuel. It is, therefore, premature to assert changes in the regulatory framework may be needed for crediting safety enhancements as described in Task 1.		The staff is aware that the industry may seek to recoup margin gained through the improved performance of accident tolerant fuel in an attempt to offset the economic costs associated with the development and use of the fuel. At this time, the staff has not been approached with specific plans related to this type of initiative. However, the staff will continue to fulfill its mission to provide reasonable

				assurance of adequate protection of public health and safety.
11	Anonymous	The regulations in 10 CFR 50.69 provide for special treatment of structures, systems, and components (SSCs). The regulations in 10 CFR 50.69 would exclude ATF fuel from special treatment based on defense in depth as a primary fission product barrier.		The ATF working group ("the working group") agrees with this comment. When referencing 50.69, the plan is referring to the fact that changes in the PRA model owing to the plant response-related impacts of loading ATF may lead to changes in categorization (i.e., RISC 1,2,3, or 4) for some components. The plan is not suggesting that the fuel itself would be treated differently under 50.69. The phrase, "regarding Title 10 of the <i>Code of Federal Regulations</i> (10 CFR) 50.69" will be removed from pg. 2 of the plan to improve clarity.
12	Anonymous	For Task 3, use of Standardized Plant Analysis Risk (SPAR) models are insufficient as the sole basis for NRC approval of risk-informed licensing actions. The MELCOR code is not normally used to supplement incomplete probabilistic risk assessment (PRA) analysis for risk-informed licensing actions. NRC approved topical reports, incorporating results of research, is essential for consideration of any relaxations of coping times and need to be supported by Chapter 15 UFSAR accident analysis.		<p>The working group agrees with this comment. The plan is not suggesting a paradigm shift under which SPAR models would form the basis for LAR review. Instead, it is expected that the licensing review would follow current practices, where the NRC staff relies on risk information provided by licensee models. Licensees are expected to continue the current practice of developing and maintaining these models consistent with NRC guidance (e.g., RG 1.200).</p> <p>The SPAR models are expected to be used predominantly at the oversight phase, after ATF has been loaded. A parenthetical "(e.g., the Significance Determination Process)" will be added to the 2nd bullet on page 8 of the plan, after the word "activities," to make it more clear what this is envisioning.</p>

13	Anonymous	The Draft ATF Project Plan does not address the regulations in 10 CFR 20 that provide explicit “dose” criteria for protecting workers and the public from exposure to radioactive materials. While core damage frequency (CDF) and large early release frequency (LERF) are useful tools for risk-informed decision making, they are not surrogates for requirements concerning dose to workers and members of the public. The Draft ATF Project Plan should have explicit milestones for evaluating changes impacting dose to workers and the public, including to changes to plant source term, release fractions, accident dose, control room habitability, and effluents.		10 CFR Part 20 will be added to Task 1 for review and consideration. The staff identified that ATF has the potential to affect source term. Task 1 contains review of 50.67, "Accident source term," RG 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," and GDC 28, "Reactivity limits."
14	Anonymous	The Draft ATF Project Plan lacks adequate discussion of resources. In particular, there are timelines, but no resource estimates. Additionally, there is no discussion of funding and fee billing. The section entitled, “Preparatory Activities,” states that a “separate, non-public document also includes resource estimates each activity that will be used to develop budgets.” A publicly available version should also be provided.		NRC does not publish resource estimates ahead of the formal budget formulation process. The internal document containing resource estimates will be used to inform that process. No changes were made to the plan as a result of this comment.
15	Anonymous	Although Assumption 3 and the discussion of Stakeholder Interactions provides a general intent according to NRC public meeting policy, a more explicit communications plan is needed for the general public and to address the interests of residents in local areas near the plants where ATF is proposed to be put in reactors.		Staff will consider the need for developing a formal communication plan as our work related to ATF evolves. Currently, the NRC staff believe that the project plan is sufficient.

16	UUSA	UUSA recommends early coordination among the larger ATF community and the NRC to ensure timely development and licensing of packagings required for higher assays or pellets/assemblies containing new materials on a time line consistent with utility needs.		The NRC agrees that timely development and submittal of quality licensing packages involving new materials followed by timely regulatory review will help ensure the materials are available consistent with utility needs. The primary coordination for the development of timely and quality licensing packages is the responsibility of the utilities and the fuel suppliers. The NRC will support requests for pre-application meetings to support industry's development of its licensing plans. NRC will provide estimates of the time required for specific licensing package reviews once it understands the content and the nature of the licensing request.
17	UUSA	UUSA requests direct communication from the Commission on future proceedings		The NRC will place UUSA on its ATF communication list.
18	UUSA	UUSA is interested in how the Commission will seek to support a fuel cycle-wide response to ATF activities. UUSA recommends a working group for such a project to include at least one representative from each Fuel Cycle Facility.		The NRC staff will support fuel cycle-wide industry ATF activities consistent with its resources and legal responsibility. The nature and timing of fuel cycle activities and the extent of coordination between individual fuel cycle facilities is a matter for the industry to determine. Industry communication of its activities related to fuel cycle licensing and the planned timing of these activities in a timely manner will allow the Commission to make the budget requests to support the industry ATF activities.

19	UUSA	UUSA encourages a working group drawing from Fuel Cycle Facilities, the Class 7 transportation community and utilities to identify appropriate packaging solutions, perhaps relying on a common set of criticality analyses to underpin any such evaluations.		The NRC staff would be willing to support such a fuel cycle facility working group in a manner that is consistent with its resources and role as a regulator. It would be inappropriate for the Commission to recommend specific packaging solutions or criticality analysis methods. The staff would be willing to discuss any new criticality benchmark experiments or new packaging solutions the industry is considering.
20	UUSA	UUSA is concerned because the proposed Draft Project Plan's supporting document, Task 2, Regulatory Framework Fuel Facilities, Transportation and Storage (ML 17325877 4) states: "If enriched uranium greater than 5 percent U235 is needed, amendment requests are expected to authorize the plants to produce the higher enriched material. Any facility change to produce U3Si2-based or uranium meta-based A TF is expected to require an amendment which will likely require greater effort than an amendment request for the production of UO2-based A TF. It is expected that any such requests would be made later. These activities are expected to be addressed in future updates of this plan as industry plans become more certain." Although the quoted language specifically refers to future activities with the overall project, UUSA is concerned about multiple fuel facility amendment requests being reviewed in unison. It is understood that such a project is a combined effort across the industry. Due to the limit of NRC resources, there is a potential for a significant impact to the review of operational LARs.		The NRC staff recognizes that if industry requests multiple complex licensing actions in the same time frame there is the potential for NRC resources to be over taxed. The NRC staff has and continues to request that industry provide the staff with information on its plans including its anticipated need for licensing actions. The NRC staff uses such information to support its budget requests.

21	Harold Chernoff	<p>“For these ATF designs, the time frames for initial irradiation of lead test assembly (LTA) programs and topical report (TR)/license amendment request (LAR) review were used as a basis for the timelines discussed in this plan.” This statement clearly infers use of the topical report and amendment process. This is not consistent with other public statements and documents prepared by NRC staff and that state that exemptions and amendments are not required for LTAs. What is the basis for statements that exemptions and amendments would not be required for LTAs?</p>		<p>LTAs have been used safely for decades by the nuclear industry. However, the staff understands the need to clarify the treatment of LTAs in the design and licensing bases of reactors and a separate NRC steering committee has been established to address the issue. The ATF project plan will be updated to acknowledge this and to clarify the scope of the plan.</p>
22	Harold Chernoff	<p>“The project plan does not cover existing licensing activities, as they follow existing processes for which schedules and regulatory approaches are well-established.” This statement establishes that existing licensing and regulatory processes are well established. However, contrary to the “well established process,” NRC staff in other public statements and documents prepared by NRC staff asserts that exemptions and amendments would not be needed for LTAs. This change from the “well established process” eliminates the public’s opportunity to request a hearing on an amendment request and to request adjudicatory intervention on an exemption on an activity that has irreversible consequences (i.e., irradiation of an LTA).</p>		<p>LTAs have been used safely for decades by the nuclear industry. However, the staff understands the need to clarify the treatment of LTAs in the design and licensing bases of reactors and a separate NRC steering committee has been established to address the issue. The ATF project plan will be updated to acknowledge this and to clarify the scope of the plan.</p>
23	Harold Chernoff	<p>The activity section of Table 2 should also include a discussion and assessment of the licensing/regulatory framework for use of LTAs. It is referred to in ML17325B773 which is referenced in the table. Any proposed changes to the “well established process” should be discussed and assessed in detail.</p>		<p>LTAs have been used safely for decades by the nuclear industry. However, the staff understands the need to clarify the treatment of LTAs in the design and licensing bases of reactors and a separate NRC steering committee has been established to address the issue. The ATF project plan will be updated to acknowledge this and to clarify the scope of the plan.</p>

24	Harold Chernoff	<p>“Estimated lead times to develop the codes to be able to analyze all currently proposed fuel/cladding types range from three to six years. The lead time includes all code development activities, and considers the time required to generate new data and new models for code development and integral assessment. The lead times vary by discipline and vary for evolutionary and revolutionary ATF designs. Generally, longer lead times are estimated for revolutionary designs with the expectation that new phenomenological models will need to be developed and validated. The lead times are not independent between various ATF designs because it is anticipated that code architecture updates made for the first design can be leveraged for other ATF designs.”</p> <p>The existing regulatory requirements in plant’s technical specifications and core reload approved topical reports stipulate that fuel, including LTAs, be analyzed with NRC approved codes and methods prior to irradiation. It is not clearly stated that NRC approved codes and methods must be used and that these approvals need to be in place prior to the irradiation of LTAs. This comment directly effects the content of Tables 6 through 9.</p>		<p>LTAs have been used safely for decades by the nuclear industry. However, the staff understands the need to clarify the treatment of LTAs in the design and licensing bases of reactors and a separate NRC steering committee has been established to address the issue. The ATF project plan will be updated to acknowledge this and to clarify the scope of the plan.</p>
25	NEI	<p>In the draft project plan of 9/6/2017, there was a fourth assumption that NRC would be appropriately resourced (staffed) to support the ATF research plan. This statement does not appear in the updated plan.</p>	<p>Although not necessary for inclusion in the plan, the assumption of appropriate resourcing to support it is essential in achieving timely licensing of ATF to meet industry deployment objectives. There should be a mechanism in place for NRC to provide this assurance to all ATF stakeholders.</p>	<p>The NRC staff continues to seek the appropriate resources to fund and support the activities outlined in the plan. Currently, we believe that we will be appropriately resourced moving forward.</p>

26	NEI	<p>“Additionally, it is expected that all integral fuel behavior data will be provided to the NRC in a timely manner such that integral assessment of NRC codes can be performed.” What is meant by “integral”? Is this data different from the data referenced in the preceding sentence?</p>	<p>Suggest revising the text as follows: “Additionally, it is expected that all reactor and test generated fuel behavior data will be provided to the NRC in a timely manner such that assessment of NRC codes versus test data can be performed.”</p>	<p>The staff will modify the plan to incorporate the proposed resolution.</p>
27	NEI	<p>The near-term ATF concepts that are contemplated have been previously approved by the NRC in other forms (doped fuel and alternative zirconium based claddings) using the current regulatory framework and existing NRC codes. The document implies that an extraordinary level of NRC effort (both from a review of regulations and from a code development perspective) is required to review these designs which is contradicted by past NRC approvals of similar designs. The document states on page 1 “The project plan does not cover existing licensing activities, as they follow existing processes for which schedules and regulatory approaches are well established.”</p>	<p>Eliminate any discussion of near-term designs (existing cladding materials with new coatings) other than the general comments related to near-term designs in the first 4 pages of the document because these concepts should not require a multi-year implementation. Only the new physical, structural, or chemical aspects need to be assessed to ensure no detrimental impact occurs from their addition.</p>	<p>The plan has been updated to remove the "evolutionary vs revolutionary" language. "Near-term" and "longer-term" ATF concepts are now used to generally describe ATF concepts where appropriate. We have also clarified the staff's intent to evaluate each ATF concept individually while utilizing any prior work to inform and enhance our reviews. The plan has been updated to reflect that level of effort should be commensurate with the departure of the concept from previous designs and that each ATF concept may have its own regulatory path.</p>

28	NEI	The plan should identify any NRC effort for changes beyond the specific ATF fuel and/or cladding changes.	The project plan needs to consider how each ATF concept ties into safety benefits for operating plants.	<p>The NRC staff believe Phenomena identification and ranking tables, or PIRTs, are a key step in defining the proper design parameters, SAFDLs and accident limits for each ATF. Concept-specific PIRTs are one way to ensure that all new phenomena of safety importance have been identified and considered in planning test programs and code development activities. This includes both specific fuel and cladding changes and any credits that might be sought based on any margin gained.</p> <p>The PIRT exercises need to be conducted consistent with the concept's degree of departure from the state-of-practice. We recognize that some accident tolerant fuel concepts have limited new phenomena. Limited scope elicitation on knowledge gaps may be sufficient for small departures, while comprehensive review of a concept's potential impact on all GDCs may be needed for large departures Initial PIRT steps (to define issue, objectives and hardware/scenario) ensure the scope and depth of the exercise is well define before elicitation begins. The individual PIRTs will inform the regulatory path for that ATF concept. We plan to elaborate on the PIRT process and the individual regulatory paths in the final Project Plan to capture this.</p>
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29	NEI	When discussing doped UO ₂ pellets, coated cladding, or more advanced pellet or cladding concepts, it should be clear that the specific material description is an example of the concept. For example, the second paragraph of pg. 4 does not include doped UO ₂ pellets and its exclusion does not provide the right level of complexity of the issue.	Clearly denote that specific materials discussed are used as examples of the technology and do not define acceptable materials for pellet doping elements or cladding coatings, etc.	The staff agrees that clarification on this point is helpful and the language in the plan will be modified to clarify this.
30	NEI	The various coated Zr technologies may be considered as a variation of normal fuel material development for application to the current regulatory framework. Additionally, ferritic stainless steels (i.e., FeCrAl) are similar to conventional fuel in that metallic cladding and the cladding failure modes are expected to be similar. As such, a regulatory framework for FeCrAl cladding is expected to be similar to the existing framework and the framework would be modified appropriately for the new cladding's performance characteristics.	It is recommended that the NRC consider contemporary experience in approving new materials that are variations of normal (e.g., GNF-Ziron, NSF, etc.) to compare with the targeted review cycles for coated Zr ATF materials to evaluate how current regulatory process capability can support the requested review cycles.	The NRC staff have clarified our intent to evaluate each ATF concept individually while utilizing any prior work to inform and enhance our reviews. The plan has been updated to reflect that level of effort should be commensurate with the departure of the concept from previous designs and that each ATF concept may have its own regulatory path.

31	NEI	<p>The NRC project plan is not risk-informed. It starts off with this caveat: "The project plan does not cover existing licensing activities, as they follow existing processes for which schedules and regulatory approaches are well-established." The ATF project plan is above and beyond the existing licensing actions for conventional fuels.</p>	<p>For fuel concepts that are conventional cladding materials with an additional barrier (coatings) the licensing approach should use the existing licensing process to allow the new concepts to demonstrate their performance. We recommend that the NRC assure the degree of regulatory interest & concern is consistent with the amount of uncertainty and the potential consequence of performance uncertainty.</p>	<p>The ATF plan describes the agency's preparation to conduct a timely and efficient review of new concepts. It is not intended to describe policy changes or new regulatory requirements. Instead, the plan aims to communicate the agency's actions that will allow for more streamlined review and ensure that communication with vendors, licensees, DOE, and others takes place to maximize the efficiencies.</p>
32	NEI	<p>In the second paragraph the last 2 sentences were added to the description of "evolutionary" vs. "revolutionary" ATF concepts. The first sentence simply explains the meaning of the terms (for the purposes of the research plan) and is a useful clarification. However, the second sentence states that regulatory requirements do not vary between evolutionary and revolutionary (ATF) designs. It is not clear what this is intended to mean.</p>	<p>It is recommended that each ATF concept be evaluated on an implementation timeline specific to that concept's technical and licensing attributes considering whether that specific ATF concept has any key policy discrepancies and whether any regulatory infrastructure would need to be</p>	<p>The plan language will be modified to address this comment by using the terms "near-term" and "longer-term." The terms evolutionary and revolutionary were originally used as terms of convenience to differentiate among the technologies based on the current state of knowledge and level of departure from current designs. The plan will be enhanced to make it clear that each concept will be treated on its own merits and the timeline and licensing roadmap will be dictated by the outcome of the phenomena identification and ranking table (PIRT) exercises.</p>

			<p>developed to support that particular concept's implementation. Similarly, the regulatory processes need to be evaluated for impacts to the metrics of CDF / LERF based on different isotopic releases for each ATF concept. NEI suggests enhancing the project plan to differentiate between the types of concepts while not prescribing the exact lead times for implementation for multiple concepts rather than being binned with associated long development timelines based on non-specific lead time durations.</p>	
33	NEI	<p>An additional aspect to the licensing of ATF is a review of relevant regulatory infrastructure that may need to be updated to enable realization of the safety and economic benefits of ATF.</p>	<p>The industry has efforts underway to review potential regulatory changes based on expected safety benefits and will engage with the NRC steering committee later this year.</p>	<p>NRC staff agrees with this statement. This is covered by Task 1. No changes were made to the plan based on this comment.</p>

34	NEI	We suggest that the NRC consider reviewing "preliminary" applications that are based on atomic scale modeling and/or limited test reactor data with the understanding that data that verifies the atomic scale modeling will come later. This will avoid a situation where a significant amount of data is transmitted to the NRC at the conclusion of a test program while the NRC is also reviewing the corresponding models.	The NRC should consider reviewing "preliminary" applications that are based on atomic scale modeling with the recognition that data that verifies the atomic scale modeling will come later.	At this time, the NRC staff has had no indication from fuel vendors that they intend to come in for licensing with an atomistic scale modeling methodology. Instead, fuel vendors have indicated that they plan to use these tools to inform the design of engineering scale codes for licensing. If the vendors plan to pursue this route, the NRC is open to starting a dialogue.
35	NEI	The document appears to address dry fuel storage Certificates of Compliance only and it omits wet storage of ATF in spent fuel pools. The project plan should include a review of regulatory requirements for storage of ATF in spent fuel pools and identify any changes necessary to allow storage of ATF in the spent fuel pool.	A review of regulations for the complete life cycle should be considered for each ATF concept as regulations beyond power operation may be impacted.	The ATF fuel placed in the spent fuel pool will be covered under the operating plants' license. In the plan, review of requirements for ATF wet storage is covered in Task 1 by review of 50.68, "Accident source term," GDC 61, "Fuel storage and handling and radioactivity control," GDC 62, "Prevention of criticality in fuel storage and handling, " and Chapter 9 of the standard review plan. No changes were made to the plan in response to this comment.
36	NEI	The project plan should provide a more innovative risk-informed approach to licensing. Each ATF concept is unique and should be evaluated on its own merits rather than being binned into broad categories (i.e., revolutionary and evolutionary) with limited development timelines based on non-specific lead time durations.	Industry development schedules and regulatory licensing schedules need to be aligned using actual dates for each concept yielding a critical path schedule with considerations for whether key policy discrepancies exist and where regulatory infrastructure may need to be	As more information is known about each ATF design and schedule the ATF plan can be updated to better capture the regulatory path of each ATF concept. The plan has been updated to remove the "evolutionary vs revolutionary" language. "Near-term" and "longer-term" ATF concepts are now used to generally describe ATF concepts where appropriate.

			<p>developed to support that particular concept's implementation. This way the project plan can remain flexible and at a high enough level to be an effective guidance document providing individual timelines for each fuel concept based on that concept's specific features.</p>	
37	NEI	<p>The project plan indicates that the NRC will: "Identify whether, and if so what, regulatory guidance needs to be generated to accommodate licensing ATF designs under the current regulatory framework." The current guidance is based on Zr/UO₂.</p> <p>The lack of regulatory guidance for fuel systems that differ from these prescriptive perspectives creates regulatory unpredictability and instability as demonstrated with the ATF LTA issue. The NRC ATF plan does not address the need to update existing regulations or regulatory guides to a higher level path addressing key safety goals rather than the existing prescriptive path for a specific fuel design. This prescriptiveness of the fuel regulatory process severely limits innovation in fuel designs. Will NRC consider updating the current regulatory process as found in NUREG-0800 for more generic fuel reviews?</p>	<p>NRC needs to update existing prescriptive regulatory processes and guidance to improve regulatory stability and predictability for future fuel reviews. The industry has conducted initial reviews and has identified areas where we believe changes to regulatory guidance are needed. We stand ready to share the results of our initial reviews and provide input to the development of a prioritized schedule to move forward with</p>	<p>NRC welcomes further engagement on this topic and will consider updating relevant guidance based on the concept-specific licensing roadmaps developed for each concept.</p>

			the necessary updates.	
38	NEI	It is extremely positive that three different offices of the NRC are coordinating to produce and execute this plan. The development and deployment of ATF technologies is very complex, so all regulatory aspects of the products, and equally important, their benefits, have to be covered in the licensing roadmap.	Continue and maintain the coordination between NRR, NMSS and RES. Incorporate the responsibilities of each NRC office into the plan.	The NRC staff will continue cross-office coordination during implementation and maintenance of the ATF project plan through the steering committee and working group.
39	NEI	The readability of the plan should be enhanced. The organization of the document is confusing, and the document does not contain a roadmap of its contents. The document appears to cover each major task twice. The first 14 pages give an overview of the major tasks, including summary tables of each major task. Then each major task is discussed a second time, but in more detail, in the remaining pages.	Near the beginning of the document, provide an overview of the document structure. Use labels and headings throughout the document to enable the reader to understand if he or she is in the overview portion of the document or in the detailed discussion portion of the document. Consider integrating the two sections so that each task is addressed only once.	The staff believe that the structure of the plan is appropriate but will seek to increase the readability of the plan where appropriate.

40	NEI	Please clarify the intention of the sentence “The staff expenditures to support design-specific regulatory hurdles will begin with the receipt of an applicant’s letter of intent (LOI) authorizing fee-based pre-application activities.”	There is no need to delay until receipt of an applicant’s letter of intent. Issues can be discovered early in the development timeline in parallel with any research or development activities thereby reducing the overall timeframe for implementation. The NRC should follow an off the fee based structure similar to advanced reactors for development activities.	The concept of a "letter of intent" will be clarified in the updated plan. The agency does not intend to delay implementation of the plan and will seek to begin concept specific activities, including conducting PIRT exercises, immediately following the issuance of the plan.
41	NEI	The GNF NSF experience where the NRC agreed to an expanded Lead Use Channel program is viewed as a best practice for accelerating experience while minimizing concerns over performance uncertainty.	The NRC should look for opportunities to identify similar efficiency improvements and the industry will also provide suggestions.	Best practices from the NSF program (and other LTA programs) will be taken into consideration.
42	NEI	The document would be enhanced by providing opportunities for more direct input from stakeholders.	The NRC should identify a more efficient approach to continued enhancement of the plan.	The plan notes a significant number of planned stakeholder interactions and the staff believe that list to be sufficient, at this time. The plan is intended to be a living document and the knowledge gained through the interactions outlined in the plan will help determine when updates are necessary.
43	NEI	Has NRC constructed a timeline that integrates Tasks 1-4 with the anticipated availability of data from DOE and industry research efforts? Such a timeline would be beneficial in assessing the reasonableness and scheduler risks of this plan.	Using currently available information, construct a timeline that integrates Tasks	A milestone schedule has been added to Section 3.1 of the plan to address this comment.

			1-4 with the anticipated availability of data from DOE and industry research efforts.	
44	NEI	The plan is not clear on the expected involvement of the NRC on the Phenomena Identification Ranking Table (PIRT) efforts, which are to be led by industry. The industry is responsible for completion of the PIRT process.	Further dialogue is needed on this subject.	The plan has been updated to include a full section on the NRC's PIRT strategy on ATF. Section 3.4.3 addresses this comment.
45	NEI	The document places a lot of emphasis on the development of NRC codes to model all of the ATF designs. This effort is duplicative of the industry efforts to develop codes to address the ATF designs.	The industry does not see a value in Task 4 of the project plan. The NRC could, instead of developing codes to model the ATF designs, rely on the industry developed codes. The NRC could acquire the codes and supporting data from the industry and perform a detailed review, including sensitivity studies, as part of their review of the codes. This will result in both a cost and schedule savings to both the NRC and industry. The document would need to be extensively modified to reflect the use of	The NRC is responsible for independently verifying the safety case presented in topical reports and license amendment requests. This does not always require separate, independent confirmatory calculations using NRC developed tools. For many incremental changes in fuel design, independent confirmatory calculations using NRC developed tools were not necessary. NRC typically performs independent confirmatory analysis to review cases where uncertainty is large or margin is small. For initial ATF licensing, where limited data will be available to formulate and validate models, we believe independent confirmatory calculations will be needed. In these instances, it is important that NRC staff performing confirmatory calculations have clear understanding of the assumptions and limitations of the analytical tools they use. They must understand the range of conditions for which the code has been validated and they must

			industry versus NRC codes.	understand the nature of the validation database. The NRC is open to discussing areas where industry codes, together with their validation database and documentation of code assumptions and limitations, could be provided to the NRC for use in independent verification of the safety case for ATF.
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46	NEI	<p>The mapping of the ATF specific hazards to regulations could be done (or initiated) by the vendor advocating the fuel and cladding change.</p>	<p>The individual ATF concept timelines should be started immediately to support industry plans for deployment of ATF. There is no need to delay until receipt of an applicant's letter of intent. Issues can be discovered early in the development timeline and discussions initiated earlier to support an integrated schedule thereby reducing the overall timeframe for implementation.</p>	<p>The staff believe Phenomena identification and ranking tables, or PIRTs, are a key step in defining the proper design parameters, SAFDLs and accident limits for each ATF. Concept-specific PIRTs are one way to ensure that all new phenomena of safety importance have been identified and considered in planning test programs and code development activities. This includes both specific fuel and cladding changes and any credits that might be sought based on any margin gained.</p> <p>The PIRT exercises need to be conducted consistent with the concept's degree of departure from the state-of-practice. We recognize that some accident tolerant fuel concepts have limited new phenomena. Limited scope elicitation on knowledge gaps may be sufficient for small departures, while comprehensive review of a concept's potential impact on all GDCs may be needed for large departures. Initial PIRT steps (to define issue, objectives and hardware/scenario) ensure the scope and depth of the exercise is well defined before elicitation begins. The individual PIRTs will inform the regulatory path for that ATF concept. We plan to elaborate on the PIRT process and the individual regulatory paths in the Project Plan to capture this. We have clarified the staff's intent to evaluate each ATF concept individually while utilizing any prior work to inform and</p>
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				enhance our reviews. The plan has been updated to remove letter of intent.
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47	NEI	There are no tangible benefit to SPAR model upgrades (assuming that ATF provides the benefits perceived) until such time as applicants begin to try to credit 50.69.	Consideration of ATF combined with other risk informed applications should be considered as an added activity (f) in Table 5.	<p>The NRC staff disagrees with this comment. For effective use in their oversight role (SDP, ASP, MD 8.3), the SPAR models must reflect the as-built, as-operated plant. To the extent that ATF significantly changes the PRA modeling and its outputs, the SPAR models should strive to reflect these changes in order to provide accurate inputs into the oversight process. This is true regardless of whether a particular plant seeks to implement risk-informed initiatives such as 50.69.</p> <p>If the change to PRA modeling/output for some ATF designs turns out to be modest, or if the agency decides to use a more qualitative approach to initial treatment of ATF in SDP, then it may make sense to defer model updates.</p>
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48	NEI	Footnote 1 defines a batch as "50% or more" of the core. This is too high. Batches are often approximately 33-40% of the core. If this is a trigger, it will result in program delays.	Revise the definition to be a more realistic number. (e.g., ~30-40%)	<p>The NRC staff agrees in part with this comment. At this time, it is unclear whether ATF will be loaded in a phased versus complete-core-at-once manner. If the former, then the 50% value may need to be re-visited. At present, it is simply intended as a marker for when overall core-wide response would start to be dictated by ATF performance. Some PRA aspects are driven primarily by core-wide response (e.g., total H₂ production) while others are controlled by the most limiting assemblies (e.g., peak nodal temperature). In the future, the project plan may be updated to a value other than 50%, once more specifics are known.</p> <p>In addition, the footnote in question will be expanded to include a statement similar to: "At present, this value is only intended to be illustrative of the binary nature of the PRA implementation approach. Some PRA aspects are driven primarily by core-wide response (e.g., total H₂ production) while others are controlled by the most limiting assemblies (e.g., peak nodal temperature). Therefore, a different threshold or a graded approach may ultimately be needed."</p>
49	NEI	It is unclear who the MELCOR and MAAP meetings and PRA meetings are with.	EPRI could support these analyses with review and comment by the vendors.	<p>In general, the PRA sections of the Project Plan are not as mature as other sections of the plan because the staff has not received definitive information about the industry's interest in leveraging PRA methods in conjunction with ATF deployment. The NRC staff welcomes</p>

				opportunities to discuss how EPRI could support the use of PRA methods for ATF.
50	NEI	<p>The proper design parameters, SAFDLs and accident limits for each ATF option need to be defined in order for this activity to be performed. The vendors should define the design and safety requirements and express what data is needed to support the requirements.</p>	<p>The key schedule driver to provide the basis to fully capture and realize ATF safety and economic benefits appears to be the development of advanced modeling and simulation along with expedited experimental data collection. The new ATF concepts should be implemented using the current design process. For example, the normal fuel engineering practice that includes full scale testing would be used to establish any update for the steady-state hydraulic models and obtain DNB data. The existing models and methods would then be calibrated to the new cladding material. Similarly, the application of transient and accident codes would only be a variation of the</p>	<p>The NRC staff believe Phenomena identification and ranking tables, or PIRTs, are a key step in defining the proper design parameters, SAFDLs and accident limits for each ATF. Concept-specific PIRTs are one way to ensure that all new phenomena of safety importance have been identified and considered in planning test programs and code development activities.</p> <p>The PIRT exercises need to be conducted consistent with the concept's degree of departure from the state-of-practice. We recognize that some accident tolerant fuel concepts have limited new phenomena. Limited scope elicitation on knowledge gaps may be sufficient for small departures, while comprehensive review of a concept's potential impact on all GDCs may be needed for large departures Initial PIRT steps (to define issue, objectives and hardware/scenario) ensure the scope and depth of the exercise is well define before elicitation begins. We plan to elaborate on the PIRT process in the final Project Plan to capture emerging plans.</p>

			existing codes and methods driven by any new limits (e.g., establishing a new SAFDL that allows transient dryout for specified times as deriving from the materials and fuel performance work).	
51	NEI	Lead times identified in Table 2 have increased from the 9/6/2017 draft. These increases likely will impact industry timelines for ATF deployment.	We look forward to better understand the justification for the anticipated increased lead times and support further dialogue to identify potential approaches to reduce the projected lead times.	NRC is committed to conducting efficient and effective reviews of ATF designs consistent with our principles of good regulation. The timelines mentioned have been refined based on fine-tuning of NRC projections between issuance of the outline of the plan and the draft plan. The plan is meant to be a living document and will continue to be kept up to date as we move forward.
52	NEI	The project plan should consider all aspects of licensing including transportation and deployment requirements.		The staff recognizes that ATF licensing may require consideration of multiple aspects of fuel cycle licensing. The plan reflects the staff's current understanding of future industry requests for licensing actions. The staff continues to solicit information updates from industry on its plans and needs for licensing reviews. Future revisions of the plan will reflect the licensing needs that industry has communicated to the staff.

53	NEI	<p>The discussion of transportation packages does not address transportation of enriched uranium prior to its fabrication into fuel assemblies. Instead, the discussion is limited to transportation of fresh and used fuel assemblies. Also, the discussion does not address the potential need for critical experiment benchmarks for enrichments greater than 5 wt% or for uranium in forms other than those now in use.</p>	<p>Revise the discussion of transportation packages to include transportation of enriched uranium prior to its fabrication into fuel assemblies. Address transportation issues with uranium in various forms enriched to greater than 5 wt%. Address the potential need for critical experiment benchmarks for enrichments greater than 5 wt% or for uranium in forms other than those now in use.</p>	<p>The staff recognizes the need to transport enriched uranium to fuel fabrication facilities. The staff recognizes the potential for industry to request approval of packages for transporting material enriched greater than 5 % or uranium in forms not currently approved. Industry has not notified NRC about plans to request reviews of such packages. Future revisions of the plan will reflect the licensing needs that industry has communicated to the staff.</p>
54	NEI	<p>How does the anticipated schedule articulated in this section compare with industry's anticipated schedule?</p>	<p>Describe how the schedule articulated in this section compares with industry intentions based on publicly available information.</p>	<p>As stated in the project plan the schedule is very preliminary, but at present, PRA is not seen as an area that is likely to become critical path. Publically-available information provided by external stakeholders supports this view (see, for example, NEI slides from Feb. 27, 2018 public meeting).</p> <p>The working group believes that the PRA schedule should align reasonably with the industry schedule (both of which are subject to change). This item will be resolved by project-wide schedule development activities.</p>

55	NEI	The plan does not account for potential synergies between ATF concepts and other regulatory programs.	Please consider how ATF concepts may combine with other regulatory programs to impact plant operations.	More clarity on what the commenter has in mind would be helpful. The staff does agree that the NRC should study the impact that ATF may have on existing regulatory programs and plant operations. This is the reason the working group believes it is critical to have staff engaged throughout the process. As this concept is already documented in the project plan, no changes were made as a result of this comment.
56	NEI	It is unclear what the NRC's basis for developing their own codes and methods. Will the industry need to wait on the NRC to finish their independent methods development?	Modeling and simulation capabilities advancements that exist today can shorten the licensing timeline considerably and support a more transformational shift in the NRC's licensing approach that is needed in order to license ATF and realize the safety and economic benefits from these advanced technologies while still maintaining the independent confirmatory process needed for a thorough regulatory review. This effort will require close collaboration and alignment between the industry, DOE,	NRC is required to independently verify the applicant's safety case. While NRC is not required to have their own codes, verifying an applicant's safety case sometimes requires independent confirmatory analysis. For initial ATF licensing, where limited data will be available to formulate and validate models, we believe independent confirmatory calculations will be needed. The codes NRC elects to employ for independent confirmatory calculations will be determined based on the review schedule and the required models for each ATF concept. The NRC maintains awareness and we are continuing to learn about the capabilities of the advancements in modeling and simulation. Validation of these tools against relevant data will be essential to demonstrate their potential to support NRC's licensing activities. While it appears that advanced modeling and simulation can play a useful role to inform experimental programs and identify testing priorities, we do not believe

			<p>the national laboratories, and the NRC which is essential for ATF to be successful. Advanced modeling and simulation (e.g., RISM, CASL, and NEAMS) can facilitate ATF implementation with key support to utilities and vendors on design considerations, normal operation evaluations, and ATF fuel performance assessments. Therefore, the development of new NRC codes and methods may not strengthen the safety case and result in costly schedule delays.</p>	<p>today's advanced modeling and simulation tools are mature enough to substitute modeling for experiments. NRC's codes and methods have been specifically tailored to evaluate regulatory requirements and phenomena important to safety and they have been extensively validated. These features make them easy for staff to use and give the staff high confidence in the results that they provide. We have examined the schedules provided by the fuel vendors and believe that the NRC's codes and methods can be updated on a schedule that supports our regulatory review activities.</p>
57	NEI	<p>As part of NRC's review of vendor methods, the NRC can develop sufficient knowledge of phenomena to make judgments of adequate protection without spending the time and resources to create yet another independent set of methods based upon the same benchmark data.</p>	<p>The use of the tools now available to the NRC through their collaborations with DOE and national laboratories can reduce the time and cost of introducing innovative technologies into operating nuclear plants by reducing</p>	<p>The NRC is currently coordinating with DOE and national laboratories to better understand the capabilities of the DOE codes to potentially reduce the number of time-consuming and costly experiments and demonstrations.</p>

			the number of time-consuming and costly experiments and demonstrations. The time and resource savings addresses one of the major hurdles in getting ATF to market	
58	NEI	NRC states that a major assumption is that they "...will not perform independent confirmatory testing for specific ATF designs. It is expected that all necessary data needed to develop models will come from DOE, industry, or other organizations. Additionally, it is expected that all integral fuel behavior data will be provided to the NRC in a timely manner such that integral assessment of NRC codes can be performed." NRC is not required to have their own codes, only to maintain conflict of interest free confirmatory codes which could be done with DOE codes. The NRC codes are not designed to be easily updated and require substantial resources that will not be developed in a timely manner.	The insistence on doing this work independently will seriously jeopardize the ability to achieve the industry timelines for ATF deployment. Also, the assumptions used to justify the need to develop in-house codes are subject to challenge by industry.	NRC is required to independently verify the applicant's safety case. While NRC is not required to have their own codes, verifying an applicant's safety case sometimes requires independent confirmatory analysis. For initial ATF licensing, where limited data will be available to formulate and validate models, we believe independent confirmatory calculations will be needed. The codes NRC elects to employ for independent confirmatory calculations will be determined based on the review schedule and the required models for each ATF concept.
59	NEI	The project plan indicates that NRC will not perform independent confirmatory testing for specific ATF designs, but, DOE and NRC have an MOU that DOE has said that they perform tests that NRC requests.	The NRC should engage with industry and vendors regarding potential test plans to ensure any confirmatory tests are appropriately focused and based on the attributes of the proposed ATF concepts.	The NRC staff agrees. The MOUs established with DOE and EPRI are designed to facilitate this engagement.

60	NEI	In the attached detailed discussion of Task 4, NRC indicates that the current plan does NOT consider new regulatory initiatives such as changes to 50.69 or EP requirements. This limits the potential economic benefits that may be obtained from ATF in the near term.	The NRC project plan is recommended to be a living document. Industry has no recommendation at this time and instead suggests it be re-accessed at a future date.	The NRC staff agrees that the plan should be reassessed at a future date regarding regulatory initiatives such as changes to 50.69 or EP requirements. They were not considered in the plan because we had not received clear indication that such initiatives would be pursued at the time the plan was written.
61	NEI	"Where possible, the NRC will collaborate with DOE in each of these activities to reduce duplication of effort in accordance with the DOE-NRC Memorandum of Understanding ¹ "	A parallel path for data should exist from the vendor to the DOE and NRC. The DOE path is information only for programmatic considerations.	It appears that the commenter is suggesting that there should be a path for fuel vendors to provide data to the NRC for use in developing and validating codes. There is nothing that precludes this. Each vendor controls their own data and the NRC is willing to engage in dialogue on this topic.
62	NEI	"Integral assessments of each of the updated codes, which includes verification and validation against data, will be completed and documented. The duration of this task is intrinsically linked to the production and availability of data from on-going test programs, largely focused on integral effects."	Suggest revising the text as follows: "Assessments of each of the updated codes, which includes verification and validation against data, will be completed and documented. The duration of this task is intrinsically linked to the production and availability of data from on-going test programs, largely focused on reactor and test generated fuel behavior effects."	The NRC staff agree with the comment and plan to revise the text as follows: "Assessments of each of the updated codes, which includes verification and validation against data, will be completed and documented. The duration of this task is intrinsically linked to the production and availability of data from on-going test programs, largely focused on integral effects."

63	NEI	It is unclear what is intended by “and beyond DBA conditions” with respect to NRC licensing criteria?	Further discussion is needed. We recommend beyond design basis conditions be considered only if an ATF change resulted in a response change to a current regulation.	That statement was intended to identify the need to develop new, or validate existing, accident source term assumptions for ATF in order to satisfy requirements related to site boundary dose, control room habitability, and equipment qualification.
64	NEI	The plan mentions scoping studies. It is not clear who is responsible for performing the scoping studies. Per the plan, it is understood that the NRC is not going to conduct any tests.	Clarify the context and responsibility for performing scoping studies.	The plan referred to scoping studies that will be performed by the NRC. The scoping studies discussed in the plan are to scope the code development and model update needs presented by ATF. The scoping studies referred to in the plan did not intend to refer to physical tests.
65	NEI	The last bullet on Page 10 states that the estimated lead times to develop codes to be able to analyze all currently proposed fuel/cladding types range from three to six years. This appears inconsistent with the Tables 6, 8, and 9, which show the lower end of the range to be 24 months for near-term concepts	The project plan should differentiate between the types of concepts to provide a high-level roadmap for the implementation of ATF concepts of that type. It should denote that this high-level timing is meant to be guidance and not a prescription of the exact time durations for implementation as each ATF concept would be evaluated on a timeline specific to that concept's	The lead time quoted of three to six years included efforts to develop codes to be able to analyze near- and long-term concepts. The project plan aimed to address ATF generally, but we recognize the need to develop roadmaps for individual ATF concepts to better differentiate between types of concepts. The NRC plans to begin work on concept specific licensing roadmaps in the near future.

			technical and licensing attributes.	
66	NEI	NRC need not always extensively benchmark/validate all codes against experimental data. This is conventional thinking, and will take a lot of additional time and effort. Much international ATF R&D is in progress (China, Far East, Europe, Russia), and NRC should be willing to utilize that data also (not just ATR, TREAT, and Halden).	NRC should supplant fuel exam data with advanced modeling and simulation (CASL, NEAMS, etc.) using a wide variety of reliable data points for benchmarking.	Advanced Modeling and Simulation may be beneficial in helping to guide experiments but there are still many areas where the state-of-knowledge only permits semi-empirical modeling. In these areas code validation is critical. More discussion is needed to better understand the industry's vision of integrating advanced modeling and simulation in fuel licensing. The NRC has, and will continue, to use data produced outside of the country to assess codes as long as the data is deemed applicable to the fuel designs under review in the US.

67	NEI	<p>For the near-term cladding technologies (i.e., coated Zr & FeCrAl), steady state neutronics analysis of the reactor core is largely an effort for the fuel vendors to adequately introduce the nuclear properties (e.g., cross-sections) into the lattice physics methods to be applied. Validation will be performed via high fidelity methods (e.g., MCNP). Standard processes for lattice physics modeling of different materials are expected to be applicable. The need for an LTR to approve the application of the lattice physics methods may depend upon the methods applied and the specific material.</p>	<p>By more closely aligning with DOE and national labs, the NRC can leverage the modeling and simulation (M&S) capabilities of their partners in lieu of developing their own redundant modeling and simulation capabilities based on the same data sets. The near-term ATF concepts would be able to use existing vendor and NRC codes with minor modifications; however, the longer-term ATF concepts could benefit the most with a new advanced modeling paradigm that allows for accelerated implementation of innovative technologies. The NRC will need to develop confidence that these new advanced M&S tools can be used reliably in the regulatory process to evaluate fuel and system performance. We</p>	<p>The NRC maintains awareness of the advancements in modeling and simulation. There are areas of cooperation between the DOE CASL/NEAMs programs and NRC in the area of neutronics. We expect to continue to follow DOE's development efforts in this area, and look for opportunities to leverage their capabilities.</p>
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			encourage the NRC to work collaboratively with DOE, EPRI, vendors, and industry, to develop confidence to support accelerating licensing with CASL, NEAMS, and RISMC capabilities without the need for separate NRC code development.	
68	PWROG	Endorse NEI Comments		N/A
69	General Atomics	Endorse NEI Comments		N/A
70	General Atomics	In order to realize the benefits of ATF technologies within the remaining lifetimes of the existing nuclear fleet, the licensing timeline must be shortened as much as possible. In particular, the development of independent computational models and tools imposes an unnecessary delay as presented in the project plan. By more closely aligning with DOE and national labs, the NRC can leverage the modeling and simulation capabilities while maintaining an independent confirmatory process through regulatory review.		As stated in the project plan, the NRC will coordinate with DOE, consistent with the terms of our MOU, where possible to reduce duplication of effort and eliminate unnecessary delays.

71	General Atomics	Each ATF concept is unique and should be evaluated on its own merits rather than being binned into two broad categories, which may penalize technologies with the greatest benefit.		Each ATF concept will be evaluated based on its own merits. The plan has been updated to remove the "evolutionary vs revolutionary" language. "Near-term" and "longer-term" ATF concepts are now used to generally describe ATF concepts where appropriate.
72	Southern	The Draft Project Plan assigns any fuel with greater than 5 weight percent U235 to the longer of the two licensing paths outlined within. SNC recommends that the treatment of fuel with greater than 5 weight percent U235 enrichment be bifurcated. In addition, fuel with enrichments up to 6 weight percent should be considered in the shorter of the two licensing paths in the Draft Project Plan. Rationale: Far fewer changes to the commercial fuel cycle are expected to be required to accommodate up to 6 weight percent U235 than will likely be required for much higher enrichments. In some portions of the fuel cycle, it may be possible to accommodate up to 6 weight percent U235 with existing margin or with only minor changes. The use of enrichments up to 6 weight percent U235 may have an economic benefit for ATF implementation, as well as a collateral positive economic benefit for current fuel systems.		The identification of evolutionary and revolutionary fuels was developed to help bring clarity to the plan. The use of 5 % enrichment as a break point was based in part on 10 CFR 50.68. As noted in the comment, it is possible that some licensing actions involving material enriched to slightly greater than 5 % could be accomplished in a short timeframe. The plan will be revised to clarify that not every licensing aspect of longer-term ATF concepts will require substantial time and effort.
73	Southern	The Draft Project Plan does not address transportation of enriched uranium prior to its fabrication into fuel assemblies. Please revise the Draft Project Plan to clearly address transportation of enriched uranium with greater than 5 weight percent U235 prior to its fabrication into fuel assemblies.		The staff recognizes the need to transport enriched uranium to fuel fabrication facilities. The staff recognizes the potential for industry to request approval of packages for transporting material enriched greater than 5 % or uranium in forms not currently approved. Industry has not notified NRC about plants to request reviews of such packages. Future revisions of the plan will reflect the

				licensing needs that industry has communicated to the staff.
74	Southern	<p>Please include in the Draft Project Plan a schedule that integrates all 4 tasks. The schedule should identify assumed start dates, as well as identify the "critical path" to irradiation of reload quantities of ATF. The schedule should consider the availability of needed data from various industry research programs. Rationale: It is evident that the NRC staff has put considerable thought and effort into the development of the Draft Project Plan. However, without an integrated schedule, it is difficult to determine which subtasks need to be addressed soon, which can be worked in parallel, and which can wait until later. Without an integrated schedule, it is difficult to understand when the NRC envisions being positioned to license an "evolutionary" or a "revolutionary" ATF product in reload quantities. It will also be difficult to track progress and assess the impact of breakthroughs or delays. A well-developed integrated schedule is essential to successful project implementation. [In line with NEI Comment 19]</p>		<p>NRC has started developing an integrated timeline of activities from Task 4, however, the exercise has revealed there are still many aspects for which NRC staff must make significant assumptions. We welcome opportunities to obtain more details of the schedule DOE and industry research efforts.</p>

75	Southern	On Page 8, Add the following shown below in red (double underlined): Task 3: Probabilistic Risk Analysis Activities • The staff will evaluate how industry batch loading of A TF may affect the current risk informed programs like risk-informed technical specification (RITS) initiatives 4b and 5b • The NRC's risk-informed oversight activities depend on standardized plan analysis risk (SPAR) models for which success criteria will need to be updated to reflect the properties/characteristics of various ATF types and batch loading of ATF		<p>The NRC staff disagrees with this comment because the proposed markup would limit the relevant PRA model changes to success criteria, whereas Task 3 explains that other changes are possible.</p> <p>For example, ATF could impact other important PRA assumptions such as HRA timing and core damage surrogate selection. Therefore, no changes were made as a result of this comment.</p>
76	Southern	On Page 9, Table 5 PRA Activities, add the following items under "Activity": (1) Incorporate properties/characteristics of various ATF types into MELCOR to be used for PRA success criteria analyses. (2) Compare risk profiles and dominant contributors to CDF/LERF from the PRA models before and after A TF [In line with NEI Comments 7 and 8]		<p>The NRC staff agrees in part with this comment. The proposed additions deal with activities related to MELCOR modeling and assessing the change in risk profiles and dominant contributors associated with ATF implementation. The former is the subject of other parts of the plan (Task 4), and is already addressed there. The latter is a modest elaboration on text already present, "to assess core damage frequency (CDF)/large early release frequency (LERF) impact, gain risk insights, and identify potential improvements to guidance." The working group agrees that the general area of risk insights includes the shift in significant risk contributors. In the subject table, under "Activity," in both columns for sub-item (c), language similar to "(e.g., significant risk contributors to CDF/LERF)" will be added after "gain risk insights."</p>

77	Southern	<p>In Page 2 of the Task 3 section, the first paragraph/sentence below the bulleted items states: "The staff will need to ensure that licensee's PRAs continue to use acceptable models and assumptions as part of the implementation of ATF and update internal models (as necessary) to reflect the ATF plant modifications. "Rationale: In order to reflect the true risk of the plant, and any subsequent improvement from ATF, all the other hazard PRA models (Fire, Seismic, etc.) should be updated along with the Internal Events PRA model.</p>		<p>The NRC staff agrees in part with this comment; however, the commenter appears to have misinterpreted the term "internal" to mean "internal events," whereas it is referring to the NRC's internally-developed models (as opposed to licensee models cited earlier in the sentence). The staff agrees that PRA models of other hazards (e.g., fire, seismic) should be updated along with the internal events PRA. In the subject quote, the word "internal" will be replaced with "NRC's" to improve the project plan's clarity.</p>
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