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This is my personal professional expertise. And my remarks not related and not reflect position of my employer.

In the presented document, the ongoing impact/influence of LWR fuel requirements is being felt. It is probably very difficult to get rid of this. If this does not work and it is impossible to abstract, it is proposed to separate the LWR requirements. And even highlight them in a separate section or even in a separate document.

The document should contain a specific and precise technical definition of subject "fuel qualification" and "fuel qualification process".

Chapter 1.2.

Such document should not include phraseology like "for example". In addition, such an official document can't include references to specific types of fuel even as an example. Such references could be incorrectly interpreted by applicants and allow them, in turn, to refer to this official document as on recommendation.

Moreover, there is sufficient scientific, engineering, technical evidence that fuel and core should be considered exclusively in conjunction with PCS and all complex of reactor unit safety systems. This means that fuel can't qualify separately from PCS and/or safety systems. Probably this does not need to be specified strictly, but a more specific reference in the document is necessary.

Chapter 1.3.

A more detailed enumeration of the neutron-physical characteristics is probably required, not only mentioned "feedback". Also, the phrase "thermal-fluid performance" here does not sound like a strictly exact technical definition in context.

It is also unclear how fuel (itself) affects the reactor core seismic behavior if the topic here is rather a fuel composition (fuel meat if you like) but not fuel design. Probably it is necessary to separate and/or clarify the concepts of "fuel" as fuel composition, and/or "fuel", as fuel elements design or even "fuel" as core (itself).

Chapter 2.1. etc. (probably required additional consideration)

Such document should not include phraseology like "note that ...", or "some", or "reviewed multiple times".

Probably clarification of the term "nuclear facility" (vague here) is required, and a different term should be used. The facility, in this case, is not an accurate term to define a reactor facility. And fuel, first of all, qualifies for specific reactor design/type usage.

When referring to "8 criteria" it is necessary to put a reference on the original document. It seems to me that this paragraph should be defined more precisely, although I quite understand what it is about.

Chapter 2 has many useful links (references), but all these links are too complicated, not structured, and not built in a systematic way. I would advise you to build a table or diagram with the connections of points and references for additional information. Such a diagram will immediately show unnecessary intersections and inaccuracies.

Chapter 3. etc.

The main goal decomposition does not seem correct (Fig. 3.1). G1 and G2 not only goals for fuel qualifications. The manufacturing process and safety criteria vs. qualification? Truly not sure about it. Can you formalize, which "fabrication parameters significantly affect" what? At the same time, below "complete manufacturing specification is not expected as part of the licensing documentation"...

Also, I am not exactly confident about the correctness of this statement... "reactivity-initiated accidents for LWRs with zirconium-based cladding" it's pure Zr chemical property, not reactivity-initiated. For example, Cr-Ni high-temperature alloy response absolutely differently during the same, so-called "reactivity-initiated accident". Let's me ask if the temperature of Zr-cladding will increase during the residual heat removal process, because of coolant loss, what kind of accident is this? Also would be reactivity initiated?

I have recreated the full diagram for subsections 3.1. and 3.2. See the figure for notes. Probably easy to understand author's ideas with this diagram.

I couldn't understand why the authors use the term safety criteria instead of fuel acceptance criteria? Safety criteria for fuel connotations require a more precise definition, which will help the authors to clearly understand that this term, applied separately to fuel, does not seem correct.

Sections 3.3 and 3.4 do not contain anything new for fuel qualification process. Nothing from these sections would directly affect the modeling of fuel behavior and experiments with fuel. Any applicable and/or developed models, and any experiments in critical areas are evaluated according to approximately the same algorithms, techniques, procedures. And these procedures required justification separately, and definitely not in this document.

If subsections 3.3 and 3.4 should contain only recommendations specifically related only to the NR fuel qualification process and specified for this process exclusively, this will significantly reduce the disagreement between the developer and the licensee

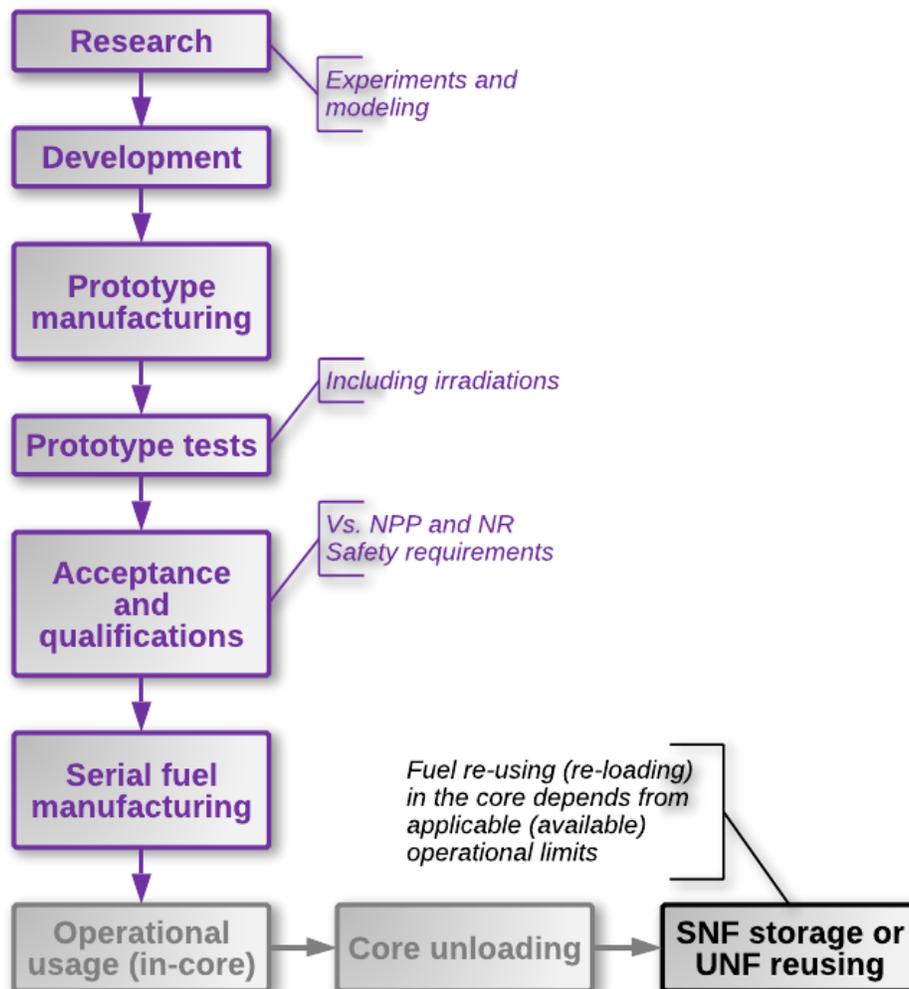
institute (NRC). Otherwise risk of endless discussions increasing.

That is, all descriptions, diagrams, and tables A-2 and A-3 do not make much sense and not related to fuel qualification process.

In Table A-1, all block names must be clearly identified with the diagrams and should be the same. A single large diagram will be more useful than separate blocks of it because this diagram could present the logic of the process.

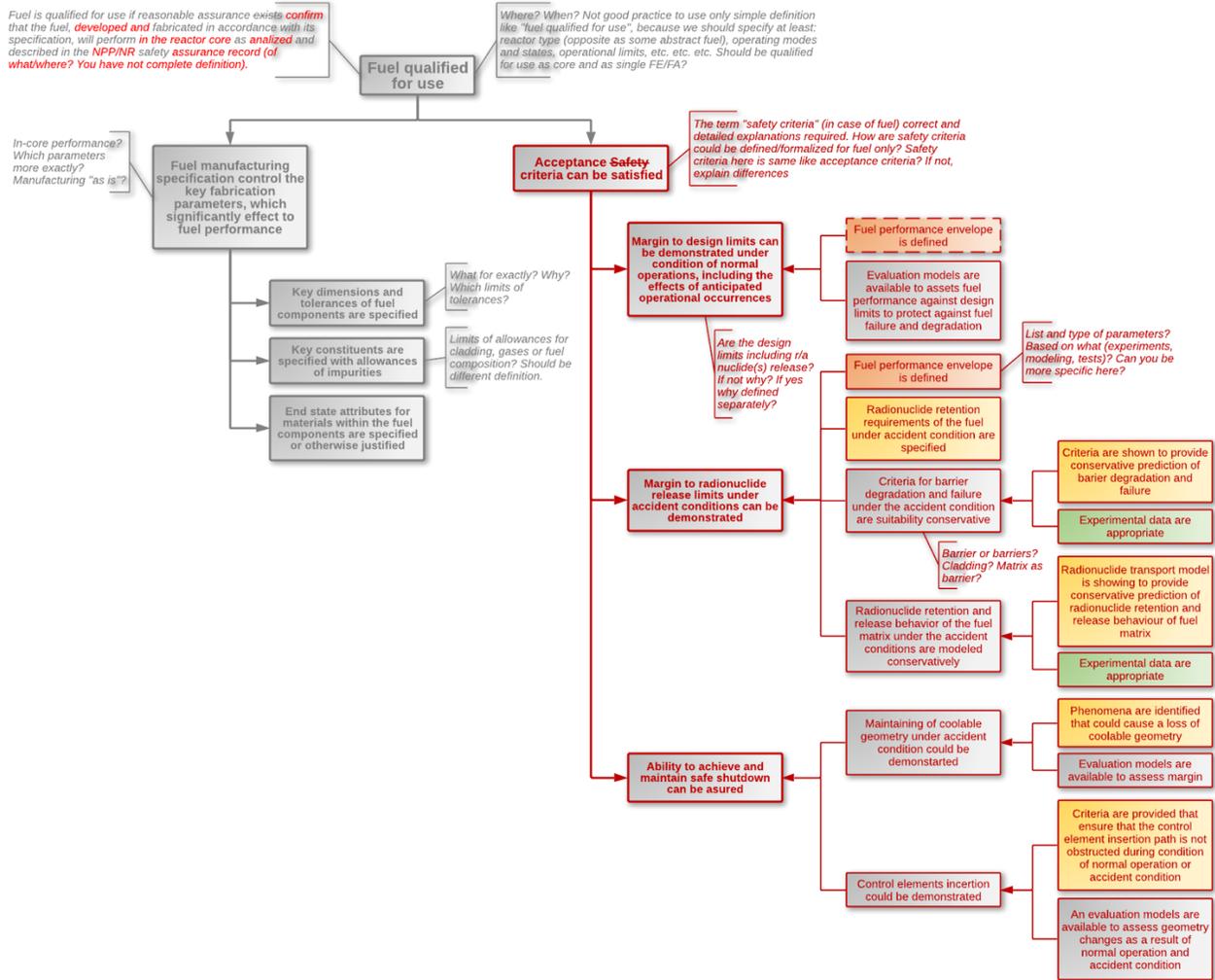
I am working on logic now and will present it my remarks additionally. I understand your logic, but this logic does not look perfect for such important document.

Diagram block G.2.1.1 has connections to two different blocks (for example). But these blocks are different in nature and cannot be substantiated simultaneously. Otherwise, this is not correct from the technical point of view.



Additional remarks about your document would be presented on diagram (see below).

In addition, a diagram of the fuel creation process could be useful, for example, like the one below, this diagram reflects the process of fuel creation and qualification for LWRs. But this diagram been created it after the fact. And today, the fuel development processes prediction are required, "a look beyond the horizon."



Additionally:

In the document: "The purpose of this report is to provide a fuel qualification assessment framework for use with advanced reactor designs that satisfies regulatory requirements".

First of all, you need to accurately and correctly answer the question what for this document been developed? Your statement does not look good enough. Where are such "regulatory requirements" for fuel (different types) formalized officially?

At least half of problem such correct formalization. Which document fuel developers can see? Where is this document in references?

In the document: The objective of nuclear fuel qualification is to: “demonstrate that a fuel product fabricated in accordance with a specification behaves as assumed or described in the applicable licensing safety case, and with the reliability necessary for economic operation of the reactor plant”

This is not perfect definition, probably good for 2007, but not perfect for today. How the economic related to so called "advanced reactor design"? We have no real economical estimation, evidence and scientifically accepted and justified analysis to say something like this. You should remember, this is not presentation for investors, this is real technical document.

Based on presented information, document authors considering fuel qualification as fuel manufacturing "as is" (only) vs. safety criteria (see diagram). At the same time, authors trying to give advises about modeling and research (experiments) approach (mentioned in my remarks above). Not seems correct approach.

In the document: Nuclear fuel affects many aspects of nuclear safety, including neutronic performance (e.g., reactivity feedback), thermal-fluid performance (e.g., margin to critical heat flux limits), fuel mechanical performance, reactor core seismic behavior, fuel transportation, and storage.

But, CHF limits good for LWR, and authors trying to separate LWR and advanced reactors in the document. I do not see thermal-physical fuel performance, parameters (mechanical parameters)? How fuel involve to seismic behavior (you considering fuel, not core end not even fuel elements or fuel assemblies) if you not considering structural analysis and fuel design? Any comments here?