StarCore Nuclear Comments
on CNSC Draft
REGDOC – 1.1.1, Licence to Prepare Site and Site Evaluation for New Reactor Facilities

Background

StarCore Nuclear, Inc. is a Canadian company currently in Montreal, Quebec. Once funding is in place the office will be moved to Ontario and staffed there.

For reference, the key elements of a StarCore Nuclear (StarCore) reactor plant project are:

- A passively-safe high temperature gas cooled reactor (HTGR) design that is based on operating experience and proven materials. No AC power is required to reach safe shutdown.
- Each reactor will produce about 35 MWt and provide 10 MWe of electricity and thermal heat. We will tailor the electrical and thermal outputs to the customer's needs.
- A reactor plant will consist of two reactors. If a site requires more than two reactor's output, one or more identical reactor plants will be added, each containing two reactors.
- A fully automated design requiring no operators on site, paired with satellite monitoring and intervention capability in a central control facility.
- Reactor plant design lifetime will be 40 years.
- Spent fuel will be replaced with new fuel at its end of life, which is expected to happen about every five years.
- Spent fuel will be stored initially at the reactor plant site until cool enough to ship and then stored at licensed sites.
- A reactor plant size of about 40 m x 60 m, and a site diameter of about 150 m.
- A required exclusion zone that is expected to be less than the site diameter, with a goal of having a zero-radius exclusion zone.
- A reactor and SSCs with safety functions embedded in the soil matrix.
- The Beyond Design Basis Accident is destruction of all above ground facilities; mitigation will require no operator action nor any intervention.
- A security-by-design philosophy, requiring no permanent on-site security personnel.
- StarCore's primary market is remote sites, either on or at the end-of-grid; island nations or similar facilities. A StarCore reactor plant will displace diesel generated electricity, as well as propane and natural gas usage.
- StarCore's initially plans to build two reactor plants in southern Canada, one at Chalk River and one at a fossil or nuclear utility site. Later projects in Canada will be at mines and other facilities in remote areas. A micro grid will be established serving these facilities as well as local communities.
- StarCore intends to export the reactor plants to other countries after proving them out in Canada, very much like the CANDU reactors were exported.

StarCore Comments on REGDOC – 1.1.1

Part A Requirements and Guidance for a Licence to Prepare Site for New Reactor Facilities

Section 6.3 Management system considerations for the security program
Section 15. Security

We do not understand the need for the level of security required by these sections during the site preparation phase of the project. It is a given that the level of security requirements will increase as the project continues, and a full program will be in place before nuclear fuel is received on the site.

However, we do not believe that there will be any prescribed information on site during site preparation. The work going on at the site will include such things as clearing, putting up fences, excavation / other earth work, setting up construction facilities and other similar activities. We would expect to secure the site, control access and egress and perform other related activities.

Recommend that these sections be reconsidered for site preparation activities. If there are activities that would trigger the security provisions in these sections, please clearly define them so that we can take appropriate action to eliminate them.

Section 9. Physical Design

This section includes dose and other criteria to be used in the determination of the exclusion zone. This topic is also covered in REGDOC – 2.5.2 Sections 4.2.1 and 6.3.

Recommend that design criteria and requirements not be included in this document except by reference to the source document, which we have assumed is REGDOC – 2.5.2.

We also would like clarification on how the criteria are applied. The dose criteria in this document refer to the “exclusion zone boundary” and in the latter document they refer to the “site boundary”. The two boundaries could be different.

Part B: Site Evaluation for New Nuclear Power Plants and Small Reactor Facilities

As we read through the requirements for site evaluations, we agree that all the requirements have merit and many would be needed depending on the site proposed. We have a few overall comments for your consideration for inclusion in Section 16. Introduction.

1. **Number of Data Requirements** - The StarCore reactor plant will be a low-risk facility given its small size and radioactive inventory; minimal release potential; passive shutdown design; automated operation; security-by-design philosophy; and other features. StarCore will make the safety case for these features in our regulatory submittals, beginning with the Vendor Design Review that we are now engaged in.

   StarCore believes that the reactor types considered for remote regions must be inherently safe, as our design is – that is requiring no AC power nor human intervention to protect the public and the environment in the event of an accident. The HTGR is

such a reactor. The IAEA has defined the HTGR as "*an inherently safe nuclear reactor concept with an easily understood safety basis that permits substantially reduced emergency planning requirements and improved siting flexibility compared to other nuclear technologies*", (IAEA, "Advances in high temperature gas cooled reactor fuel", IAEA TECDOC 1674, 2013).

Given the above we do not see the need for all the data requirements in this section. Clearly some would need to be done at every site, e.g. foundation investigations. But others should not need to be done.

Recommend that a section be added specifically for plants below a certain size and with a low-risk profile that drops some requirements and simplifies others.

2. **Existing Site Data** - We found no discussion of the use of existing site evaluation data. Since StarCore's currently planned Canadian sites include only existing nuclear, fossil power and mining sites, we expect to have a wealth of existing data that could be used. We recognize that a gap analysis will need to be performed against current requirements, and a plan put in place to eliminate the gaps found.

   We also recognize that if we were to propose a greenfield site, we would have to do a much more extensive evaluation.

   Recommend that a specific section be added to address the use of existing site evaluations and data for small, low-risk reactor plants.

3. **Enveloping Requirements** - There is no discussion on using envelopes to simplify the data needed from each site. As an example, StarCore plans to survey potential sites for seismic levels and design the plant to the most severe conditions. Our overall philosophy is to design the nuclear and safety important portions of the reactor plant to an envelope set of conditions, so that we can build that portion of the plant the same way at each site. This will greatly simplify licensing, construction and operation of our plants.

   Recommend that a section be added referring to the use of envelopes for suppliers that plan to build fleets of plants.