Supplier Opportunities: Traveling Wave Reactor Program

The following paragraphs summarize some areas in which TerraPower plans to engage supplier support for development and fabrication of fuel and related core assemblies as part of the Traveling Wave Reactor (TWR) Program. This is an initial list of potential opportunities and will be updated periodically. Some of the items or design features will be classified as important to safety or nuclear safety-related; as such, work will need to be performed under a quality program meeting the applicable requirements (e.g., Augmented Quality, NQA-1, ASME).

To be considered as a potential supplier for any opportunities listed below:
Complete the registration form at http://www.terrapower.com/suppliers to share information about your company's capabilities with us.

High Assay Low Enriched Uranium Metal Supply

The scope of supply will be to establish and qualify the supply chain and facilities to provide high assay low enriched uranium (LEU) metal and potentially natural or depleted metal uranium which may be required for enrichment down-blending.

TerraPower is currently developing plans for the commercial supply of metal fuel for its reactor project. The fuel utilizes primarily high assay low enriched uranium (LEU) metal. Additionally, natural or depleted metal uranium may be required for enrichment down-blending during the fuel slug fabrication process. The full scope may include all phases of enrichment and metallization along with delivery of the metal to a licensed facility at a to-be-determined location utilizing a shipping container fleet.

The metal shall meet the requirements of TerraPower's material specification for enriched uranium feedstock which provides requirements for isotopic composition, elemental impurities, piece sizing, lot sizing, and packaging and shipping, among other requirements. Variations from this specification may be considered but will need to be evaluated on a case by case basis. The material will be in a bulk metal form that can be handled within a typical criticality control environment.

Material quantities for the first core load are currently projected to be approximately 12.5 MT of metal uranium enriched between 13 and 19% U-235.

The material delivery is currently projected to be over a two year period beginning mid-2022 with an approximately constant rate through early-2024. Additionally, annual material supply quantities for fuel reload are required beginning around early 2026.

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Subsequent processing of the material into fuel slugs will include down-blending steps. Enrichment values are negotiable to achieve the best economic solution, but the majority of the material will need to be approximately 19% enrichment and not exceed the LEU enrichment definition (<20% U235).

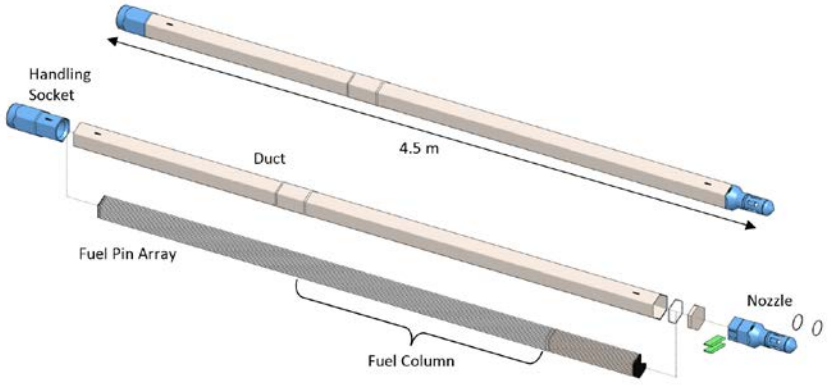
Separate but related supplier selections are in planning for the supply of fuel assemblies, packaging and transportation of the new fuel, along with a number of non-fuel core assemblies (e.g., control rod assemblies). Multiple/separate awards are currently envisioned to execute this work; however, it is possible that a single supplier may provide a complete, integrated solution, provided the advantages are evident in that approach.

Fabrication of Sodium Fast Reactor Fuel

The scope of supply will be to establish and qualify the supply chain and facilities, fabricate and deliver fuel assemblies for the reactor plant. Approximately 150 to 200 fuel assemblies are required for the initial supply by mid 2024. Annual reloads of approximately 50 assemblies will be required starting around 2026.

The fuel is similar in form to historical sodium fast reactor metal fuel. The fuel assembly has a hexagonal cross section of approximately 150 millimeter (mm) outer flat-to-flat dimension and is approximately 4.5 meters (m) total length. It is comprised of an inlet nozzle, duct, handling socket, fuel pin bundle internals, and several other small components. HT9 ferritic-martensitic stainless steel is the primary structural material and 316SS is used for the nozzle and handling socket end fittings and other small hardware. There are 200 to 300 sealed fuel pins per assembly having approximately 3.5 m total length. The fuel pins are approximately 7.5 mm outer diameter, contain metal alloy uranium-zirconium fuel slugs with sodium bond and helical wire wrap. Enrichment of the uranium metal will be <20% U235.

Example configuration as follows:



Fuel Assembly

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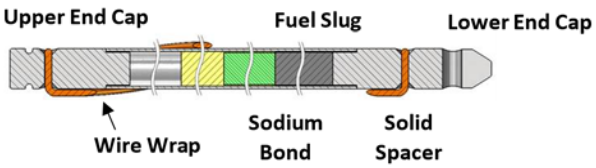

Fuel Pin

TerraPower has developed the fuel element design and worked with a number of commercial organizations to establish process capabilities to deliver HT9 material and the cladding and duct components. TerraPower has conducted some proof-of-fabrication of the fuel assembly and has demonstrated processes for all the assembly steps. In addition, TerraPower has worked with various entities to demonstrate methods for fuel slug manufacturing, HT9 endcap seal welding, sodium bonding and wire wrap processes of the fuel pins. Contact information will be made available during the bidding process.

The fuel supplier will be responsible for design for manufacturing activities, process and facility qualification, procurement of all components (excluding uranium metal), fabrication of uranium-zirconium fuel slugs from bulk metal and all fabrication activities necessary, including securing applicable regulatory approval and export licenses, to deliver and certify complete fuel assemblies to the reactor plant.

Separate but related supplier selections are in planning for the supply of Uranium Metal, packaging and transportation of the new fuel, along with a number of non-fuel core assemblies (e.g., control assemblies). In addition, the selected supplier(s) will have a strong incumbent position in the follow-on work to fabricate several other types of fuel assemblies envisioned in the longer-term TWR development program. Multiple/separate awards are currently envisioned to execute this work; however, it is possible that a single supplier may provide a complete, integrated solution, provided the advantages are evident in that approach.

Fabrication of Sodium Fast Reactor Shield Assemblies

The scope of supply will be to establish and qualify the supply chain and facilities, fabricate and deliver shield assemblies for the reactor plant. Approximately 50 to 75 shield assemblies are required for the supply by mid 2024.

The shield assembly is similar in form to historical sodium fast reactor shield assemblies. The assembly has a hexagonal cross section of approximately 150 millimeter (mm) outer flat-to-flat dimension and is approximately 4.5 meters (m) total length. It is comprised of an inlet nozzle, duct, handling socket, shield pin bundle internals, and several other small components. HT9 ferritic-martensitic stainless steel is the primary structural material and 316SS is used for the

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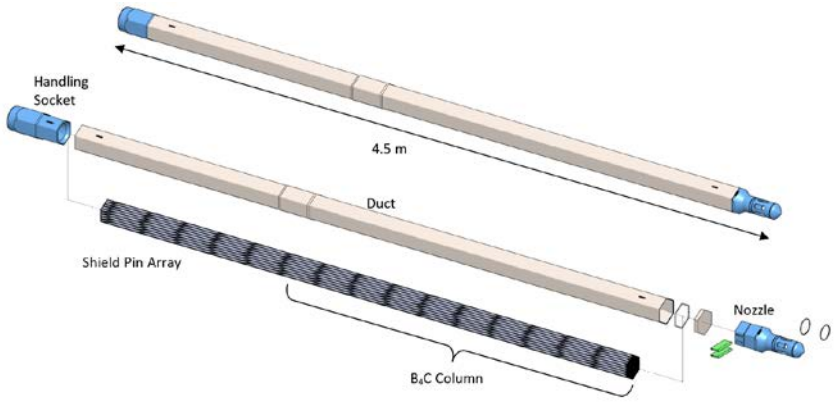
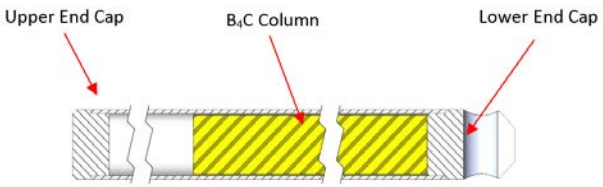
nozzle and handling socket end fittings and other small hardware. There are 19 sealed pins per assembly having approximately 3.5 m total length. The shield pins are approximately 25 mm outer diameter and contain B4C pellets.

Example configuration as follows:



Shield Assembly



Shield Pin

TerraPower has developed the shield element design and worked with a number of commercial organizations to establish process capabilities to deliver HT9 material and the cladding and duct components. TerraPower has conducted some proof-of-fabrication of the assembly and has demonstrated concepts for all the assembly steps including HT9 end cap welding. Contact information will be made available during the bidding process.

The shield assembly supplier will be responsible for design for manufacturing activities, process and facility qualification, procurement of all components and all fabrication activities necessary, including securing applicable regulatory approval and export licenses, to deliver and certify complete shield assemblies to the reactor plant.

Separate but related supplier selections are in planning for the supply of Uranium Metal, fabrication, packaging and transportation of the fresh fuel, along with a number of other non-fuel core assemblies (e.g., control rod assemblies). Multiple/separate awards are currently

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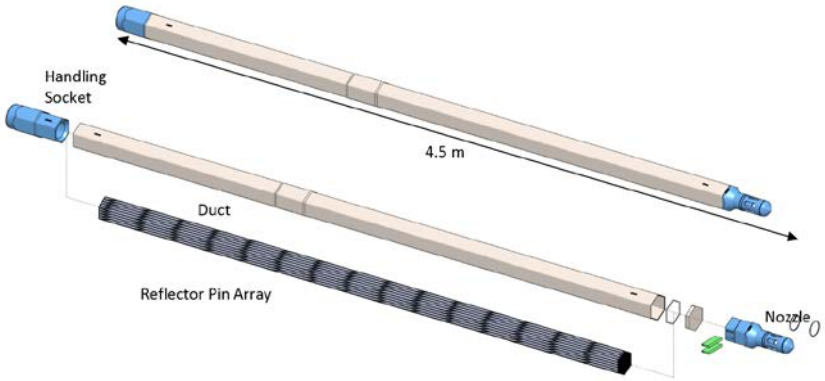
envisioned to execute this work; however, it is possible that a single supplier may provide a complete, integrated solution, provided the advantages are evident in that approach.

Fabrication of Sodium Fast Reactor Reflector Assemblies

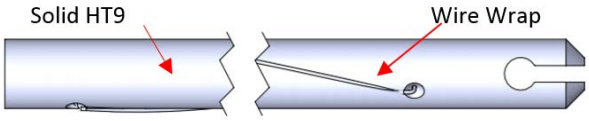
The scope of supply will be to establish and qualify the supply chain and facilities, fabricate and deliver reflector assemblies for the reactor plant. Approximately 100 to 125 reflector assemblies are required for the initial supply by mid-2024. Additional reflectors may be necessary after approximately 15 years.

The reflector assemblies are similar in form to historical sodium fast reactor reflector assemblies. The reflector assembly has a hexagonal cross section of approximately 150 millimeter (mm) outer flat-to-flat dimension and is approximately 4.5 meters (m) total length. It is comprised of an inlet nozzle, duct, handling socket, reflector pin bundle internals, and several other small components. HT9 ferritic-martensitic stainless steel is the primary structural material and 316SS is used for the nozzle and handling socket end fittings and other small hardware. There are 50 to 100 solid HT9 reflector pins per assembly having approximately 3.5 m total length. The reflector pins are approximately 15 mm outer diameter with a helical wire wrap.

Example configuration as follows:



Reflector Assembly



Reflector Pin

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TerraPower has developed the reflector element design and worked with a number of commercial organizations to establish process capabilities to deliver HT9 material and the cladding and duct components. TerraPower has conducted some proof-of-fabrication of the assembly and has demonstrated concepts for all the assembly steps. In addition, TerraPower has worked with various entities to demonstrate concepts for the wire wrap process of the reflector pins. Contact information will be made available during the bidding process.

The reflector supplier will be responsible for design for manufacturing activities, process and facility qualification, procurement of all components and all fabrication activities necessary, including securing applicable regulatory approval and export licenses, to deliver and certify complete reflector assemblies to the reactor plant.

Separate but related supplier selections are in planning for the supply of Uranium Metal, fabrication, packaging and transportation of the fresh fuel, along with a number of other non-fuel core assemblies (e.g., control rod assemblies). Multiple/separate awards are currently envisioned to execute this work; however, it is possible that a single supplier may provide a complete, integrated solution, provided the advantages are evident in that approach.

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