

Enclosure 1
Changes to Hermes PSAR Chapter 9
(Non-Proprietary)

9.6 POSSESSION AND USE OF BYPRODUCT, SOURCE, AND SPECIAL NUCLEAR MATERIAL

Special nuclear material (SNM), source, and byproduct material will be present at the reactor facility. ~~Activities covered by the Kairos Power license take place on the site. The contents of this construction permit application are intended to support the applications for applicable requirements in 10 CFR Part 30, 10 CFR Part 40, and 10 CFR Part 70 licenses may be satisfied using content contained within this Construction Permit Application. However, material license(s) are not being requested at this time and necessary license application(s) or amendments will be submitted at a future date. for the site as well.~~ This section describes the systems that interact with SNM, source or byproduct material, and the design basis for those systems to prevent uncontrolled release of radioactive materials and to maintain personnel exposure limits within 10 CFR Part 20 dose limits and as low as reasonably achievable (ALARA) objectives. Additional information on ALARA practices is discussed in Chapter 11.

Spaces in which the materials are handled and equipment used to handle the material, are subject to administrative controls to minimize contamination, to prevent radiological sabotage, theft or diversion, and to prevent uncontrolled release of the materials. A description of the administrative procedures related to use of byproduct, source, and special nuclear material will be provided in the application for an Operating License.

Waste from SNM, source material, or byproduct material is handled through the radioactive waste management program described in Section 11.2.1. The radioactive waste handling system also handles drains and vents for the facility including handling of contaminated liquids collected by the drain system (see Section 11.2.2).

9.6.1 Special Nuclear Material

SNM is received and used at the facility in the form of fresh fuel particles contained in pebbles (see Section 9.3). Fuel pebbles containing SNM use high assay, low enriched uranium (less than 20% enrichment) at different enrichment levels.

SNM is handled in the fuel intake area, the PHSS, and the reactor vessel. In the intake area, SNM is managed by compliance with ~~a~~ 10 CFR Part 70 ~~license~~, by the use of fresh fuel canisters and by the nature of the pebble design, in which the SNM is encapsulated in a graphite substrate. Section 9.3 and Chapter 4 describe how the PHSS and the reactor vessel, respectively, prevent uncontrolled releases of radioactive material. Of the systems described in this paragraph, only the fresh fuel handling areas have the potential for direct contact with the SNM during normal operation. At this location, the activity of the fresh fuel is very low and administrative procedures that minimize contact with the fresh fuel are sufficient in support of ALARA practices. In the PHSS, spent fuel is handled in canisters and shielding is used to support ALARA practices.

9.6.2 Source Material

Source material that contains unenriched uranium is also received and used at the facility in the form of unenriched fuel particles contained in fuel pebbles. Handling of fuel pebbles containing source material is within the same systems as the pebbles that contain SNM. Source material is managed by compliance with ~~a~~ 10 CFR Part 40 ~~license~~, by use of fresh and spent fuel canisters, and by the nature of the pebble design, in which the source material is encapsulated in a graphite substrate.

9.6.3 Byproduct Material

Byproduct materials are both used in and generated to support operation of the KP-FHR.

Tritium is generated at the facility and is classified as byproduct material. Tritium is generated as a result of the nuclear reaction in the core. Tritium is present throughout the primary system, ~~in the secondary~~

~~coolant, and~~ in the graphite core of fuel pebbles. Because the pebbles travel through the PHSS, tritium will be present in PHSS as well. The tritium management system manages the inventory of tritium in the reactor system.

Byproduct material is managed by compliance with ~~a~~-10 CFR Part 30-~~license~~, by use of spent fuel canisters, by the tritium management system, and by the radioactive waste management program (see Chapter 11). A description of how the tritium management system prevents the uncontrolled release of tritium can be found in Section 9.1.3. That section also describes how tritium is removed from the facility and discusses administrative procedures to minimize exposure to tritium from the disposal of tritium capture materials, in support of ALARA practices.

9.6.4 Laboratories

Auxiliary services, described in Section 9.8.5, include laboratories under the reactor operating license in which licensed material will be used. Offsite laboratories (if any) are not governed by this facility license. Byproduct, source, and special nuclear material may be handled in the laboratories associated with the auxiliary services for the site under the license(s) described above. Laboratory work involving byproduct, source, and special nuclear material is for research and testing purposes. Materials are handled appropriately (e.g., in glove boxes, as appropriate) in those laboratories so that 10 CFR Part 20 dose limits are not exceeded and consistent with ALARA practices. Airborne materials are handled through air exhaust systems, as applicable, and radioactive waste material is managed through the radioactive waste management program.