

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. The applicable requirements in 10 CFR Part 30, 10 CFR Part 40, and 10 CFR Part 70 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. 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 10 CFR Part 70, 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 10 CFR Part 40, 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. It is possible for tritium to be present throughout the primary, intermediate, and power generation systems, and in the graphite core of fuel pebbles. Because the