In November 2021, Orano performed the NRC-required Aging Management Program (AMP) inspection for the SONGS NUHOMS ISFSI.

The AMP inspection included an inspection of the NUHOMS ISFSI’s concrete horizontal storage modules and a remote robotic canister inspection of two canisters in situ. The two canisters were selected based on initial heat load, time in service, fabrication and design and module configuration, in accordance with Electric Power Research Institute (EPRI) guidance.

A cross-section of an ISFSI module with canister (labeled as “DSC,” for “dry shielded canister”) is shown in Figure 1, below.

![Cross-section of NUHOMS ISFSI module.](image)

**Figure 1. Cross-section of NUHOMS ISFSI module.**

### A. Equipment

Remote inspection equipment that meets requirements set forth in the NRC-approved AMP was used to complete the inspections of the selected canisters and modules. The equipment consisted of:

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1 The inspection included (1) the interior and exterior of the selected ISFSI modules, including shield walls, (2) the ISFSI basemat, and (3) the selected canisters’ exterior surfaces. As noted in the AMP, some areas of the module and canisters are inaccessible for inspection. These areas include: the bottom of the canisters including the grapple ring, the outer bottom cover plate and associated welds, the canister outer top cover plate including field closure welds, the canister shell crevice locations (where the canister rests on the support rails), portions of the module door facing the module interior, and the internal surface of the module that is blocked from view due to the heat shields. Because the materials of construction and environment of the components in inaccessible areas are the same as the components in accessible areas, it is reasonable to expect the condition of components in inaccessible areas to be similar, if not identical, to those in the accessible areas. Indications observed were very minor and do not challenge the safety functions of the components.
- a remote-controlled visual inspection (RVI) robotic crawler, which was equipped with adjustable-intensity LED lights and a tether transmitting high definition live video and images to the inspection staff. (Figure 2)

**Figure 2.** An RVI crawler was used for the AMP inspection.

- a suction crawler, which is a remotely-operated robotic crawler that transverses the surface of a canister to inspect both the canister and the module. The suction crawler was equipped with a chloride sampling system designed to take and secure four different samples during an excursion onto the canister. (Figure 3)

**Figure 3.** Suction crawler.

- a General Electric (GE) Mentor iQ camera system, which was used as an attachment to the suction crawler for completing visual inspections. (Figure 4)
Figure 4. A handset with monitor from the GE Mentor iQ camera system.

- a deployment crawler, which was used to deploy the suction crawler onto the canister (Figure 5), and

Figure 5. Deployment crawler.

- a vent access hoist, which was used for lowering the RVI crawler and deployment crawler through the module’s inlet vent onto the floor of the module. (Figure 6).

Figure 6. Vent access hoist deployed into a NUHOMS ISFSI module.
B. Inspection Technique

The Orano inspection team consisted of: one project coordinator, one civil inspector (for module inspections), one non-destructive examination (NDE) inspector (for canister inspections), one camera operator, three deployment/suction crawler operators, and one RVI crawler operator. SONGS provided radiation protection, security, and craft support personnel for the inspections.

Inspection of the module exteriors was performed by direct visual inspection and included the module base, roof, bird screens, door and associated fasteners, and the ISFSI basemat and shield walls. Inspection of the module interiors was performed by remote visual inspection using, primarily, the RVI crawler (Figure 2). The crawler accessed the module interior through its inlet vent. A GE camera mounted on the suction crawler (Figure 3) was used to perform inspections on areas of the upper heat shields, and front surfaces of the module that could not be seen with the RVI crawler. These inspections were completed and documented in accordance with the AMP requirements.

Inspection of the two canisters was performed by remote visual inspection using the suction crawler, the deployment crawlers (Figure 5) and the GE camera. Portions of the canisters above the canister support rails were inspected using the suction crawler. The deployment crawler entered the ISFSI module’s inlet vent (Figure 6) and placed the suction crawler (with GE camera) onto the canister above the canister support rails to perform visual inspections. The undercarriage of the canister between the support rails was inspected using the deployment crawler with the GE camera attached directly to the deployment arm.

C. Results

Orano successfully performed the AMP inspection of the NUHOMS ISFSI in November 2021. The ISFSI modules and canisters inspected met the inspection criteria and continue to function as expected. Because this was the first AMP inspection of the NUHOMS ISFSI, Orano documented some baseline superficial conditions that will be monitored in future AMP inspections going forward; these conditions are described below.

i. ISFSI Module Inspection

Several normal and expected superficial concrete conditions were observed at the NUHOMS ISFSI that will be monitored in future AMP inspections. As is to be expected with concrete structures, some small passive cracks greater than or equal to 1 mm (0.04 in.) in maximum width were discovered in the ISFSI modules. These cracks are superficial conditions (especially small considering the approximately 1-foot thickness of an ISFSI wall) that do not affect the structural integrity of the ISFSI; they appear to be a result of drying/shrinkage during fabrication and are not related to aging effects. The identified conditions have been entered into the site corrective action program for trending.

The entirety of the ISFSI basemat was also inspected, and nothing observed during the basemat inspection challenges the safety functions of the ISFSI. Some passive cracks greater than or equal to 1 mm (0.04 in.) in maximum width were discovered. These cracks were located at the edge of the basemats perpendicular to the front face of the AHSM units. These cracks were entered into the site corrective action program for trending.

Nothing observed during the inspection of the ISFSI modules and basemat challenges the safety functions of the modules or requires repair; however, all observations were documented as part of the inspection baseline and will be monitored in future AMP inspections going forward.
ii. Canister Inspection

There were no reportable corrosion indications observed during the canister inspections. Some stains or slight discolorations on the canisters were noted; however, based on the module design and the inspection observations, Orano concluded that the stains occurred prior to placing the canisters in storage.

As has been the case at other plants with horizontally-stored canisters, some scratches were identified on the surface of the canisters, which had occurred during the canister installation process. The scratches were superficial, with no evidence of cracking or corrosion. In fact, no aging-related indications of any type were identified anywhere on the canisters. Orano concluded that the canister observations did not challenge the safety functions of the canisters. All observations were documented as part of the inspection baseline and will be monitored in future AMP inspections going forward.