# The decommissioning of Zion: A status update

## By Patrick Daly

The decommissioning of the Zion nuclear power plant, being carried out by Zion*Solutions* at the plant site located in the city of Zion, Ill., about 40 miles north of Chicago, began in September 2010, and progress is well under way. In 2013, the project has primarily been focused on preparations for fuel transfer operations, reactor vessel segmentation (both units), removal of equipment from the auxiliary building for disposal, and site characterization to support both the License Termination Plan and the Multi-Agency Radiation Survey and Assessment of Materials and Equipment (MARSAME) release packages for the balance-of-plant equipment. These activities followed 2012 work that focused on starting the removal of equipment from containments, on-site rail upgrades, vertical concrete cask construction, and work to support the segmentation of reactor vessel internals.

*Story continues on page 27*
*Photos continue on pages 19 through 27*

During 2013, the construction of a stand-alone independent spent fuel storage installation (ISFSI) was completed to support the storage of 61 MAGNASTOR fuel canisters and four Greater-Than-Class-C (GTCC)

### Preparation for Fuel Transfer

***Right:*** *Workers inspect an NAC International fuel canister that has been delivered to the Zion plant site. (Photos: Zion*Solutions*)*

***Below:*** *A worker at the Zion site ties reinforcing steel as part of the construction work on NAC International vertical concrete casks.*

***Right:*** *Zion*Solutions *personnel do a dry-run test of the vertical cask transporter with an empty cask.*

***Below:*** *A first-of-its-kind robot welding system for fuel and Greater-Than-Class-C canister welding is being deployed by Zion*Solutions*. The system also has the capability to remotely perform nondestructive testing of the welds.*

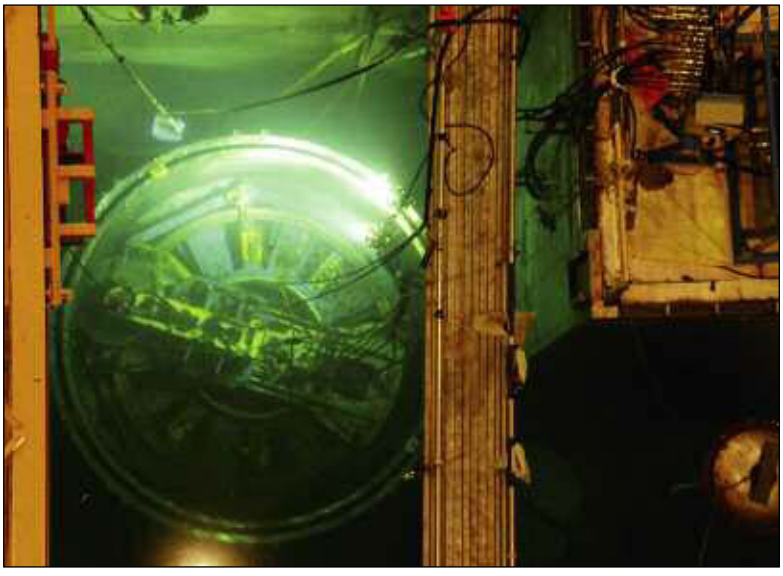
***Left:*** *The fuel transfer cask is lowered into the spent fuel pool using the fuel building's crane.*

***Below:*** *During the final dry run of fuel transfer operations, Zion*Solutions *personnel place a transfer cask with a fuel canister in the fuel pool and move a dummy fuel assembly.*

*Also as part of the final dry run, the transfer cask (with the fuel canister inside) is placed in the decontamination pit for final preparations prior to the stack-up process, which involves placing the transfer cask on top of the vertical concrete cask and lowering the fuel canister into it.*

## Component Segmentation

***Below:*** *Workers for Siempelkamp, Zion*Solutions*' team member for the segmentation of components, segment the upper reactor vessel internals in Unit 2.*



***Left:*** *Siempelkamp's tooling cuts the lower core barrel during the final stages of Unit 2 reactor vessel internals segmentation.* ***Right:*** *A view from above of the deep end of the Unit 2 reactor cavity shows the lower internals undergoing segmentation.*

***Left:*** *The upper portions of the Unit 1 steam generators are segmented in place to facilitate the future removal of the lower portions. The upper portions were packaged and loaded into railcars for transport to and disposal at Energy*Solutions*' low-level waste disposal facility located in Clive, Utah.*

***Above:*** *Work in the auxiliary building includes the segmentation and size reduction of equipment for disposal as Class A low-level waste.*

***Right:*** *A residual heat removal heat exchanger is size-reduced to facilitate packaging for shipment.*


*The removal of Unit 1's reactor coolant loop isolation valves requires the deployment of a specially designed scissor lift table.*


*Class A waste material being removed from the auxiliary building is packaged first into sacks, as shown, to facilitate loading into railcars while also controlling potential contamination.*


ENVX
206257
TRACKMOBILE


ENVX
206229

***Opposite page, top:*** *Waste from the Unit 2 containment is placed into a railcar using the heavy-lift rail system and crane.*

***Opposite page, bottom:*** *Workers rig a reactor coolant pump into a railcar for shipment to the Energy*Solutions *LLW disposal facility.*

***Above:*** *Zion*Solutions *personnel hoist a reactor coolant pump motor from the Unit 1 containment into a railcar.*

***Left:*** *A shielded bell is used to remove a liner of Class B waste resulting from Unit 2 reactor vessel internals segmentation activities.*

*Continued from page 18*

canisters. The facility has a state-of-the-art security monitoring building that is completing final security system acceptance testing and is expected to be ready for a final Nuclear Regulatory Commission inspection on November 1.

NAC International has delivered fuel transfer equipment that has been accepted for use at the site. Fuel canisters continue to be delivered, and all of the other equipment needed for fuel transfer is ready and staged for use. Zion*Solutions'* staffing and training of personnel for fuel transfer has been completed, and the project was finishing its final dry runs during the month of October. Fuel transfer operations are expected to start in November and run through the end of 2014.

The other major task that is running in parallel with fuel transfer work is the reactor vessel segmentation activities, being led by Zion*Solutions'* team member for segmentation, Siempelkamp. While some tooling has not met schedule expectations, work activities that were originally planned in sequence between the two reactor vessels was adjusted to be carried out in parallel in order to improve schedule performance.

Unit 2 internals work is wrapping up this year, to be followed by a campaign to move the GTCC canisters from the reactor cavity to the ISFSI. The next step in reactor vessel work is the thermal cutting of the vessels using a proprietary system designed in Germany. The tooling for this portion of the work has been mocked up and delivered to the site. Unit 2 reactor vessel segmentation is expected to commence in the spring of 2014.

Other activities being conducted on-site include the removal and disposal of equipment from the auxiliary building, the characterization of the site for preparation of the License Termination Plan, MARSAME release of equipment from the turbine building, low-level waste shipments to the Energy*Solutions* disposal facility in Clive, Utah, and the start of Class B and C waste shipments to the Waste Control Specialists facility near Andrews, Texas.

The photos on these pages provide a look at recent work that has been done at the site.

*Patrick Daly is General Manager of Zion*Solutions*, a wholly owned subsidiary of Energy*Solutions.

*Energy*Solutions *is looking to work with other utilities to replicate the decommissioning process and programs that are in place at Zion.*