ZionSolutions Weekly Reader

Zion Station Decommissioning and Site Restoration Newsletter

August 24, 2011

Special Edition

Reactor Vessel Internals Segmentation Project

Team Profiles . . .

Ken Bentley
Project Manager

Ron Richards
Deputy Project Manager

Ken Bentley and Ron Richards are heading up the Reactor Vessel Internals Segmentation Project at Zion Station, but if you ask them, they will tell you this is a team effort made possible by the expertise, experience and dedication of many talented people.

"A project of this size requires very detailed planning and coordination," said Ken, "and involves input, contribution and involvement from many different disciplines and areas of expertise. It's a carefully choreographed process utilizing sophisticated and state-of-the-art engineering and technology, but it's the expertise and knowledge of the team that brings it all together."

Ron agrees and added that "being ready and fully prepared to perform this major decommissioning activity comes after years of research, preparation and hard work. We were very aware that this project is an integral part of the decommissioning process and paves the way for completing large component removal, building demolition and the successful completion of the decommissioning and restoration of the Zion Station site."

See page 6 for complete profiles and to learn more about Ken and Ron's experience.

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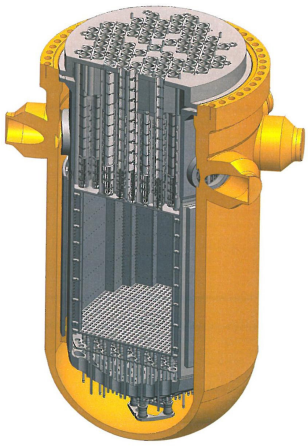
Project Profile . . .

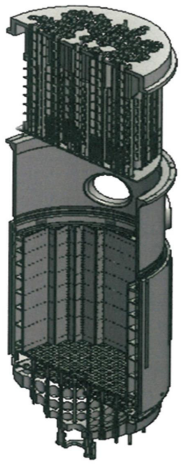
by Ken Bentley and Ron Richards . . .

In a few short months, several years of planning will come to fruition when Zion*Solutions* (ZS) D&D personnel begin filling the Unit 2 reactor cavity with water to support the segmentation of the Reactor Vessel (RV) internals. Shortly thereafter, Siempelkamp Nuclear Services (SNS) will remove both the upper and lower internals from inside the reactor vessel and place them into position inside the flooded cavity to begin the one-year effort to segment the internals of the Unit 2 reactor.



Upper and Lower Internals inside Reactor Vessel (RV)

During operation of the plant, the reactor vessel internals supported the reactor vessel core, the control rod assemblies, the core support structure, and the reactor pressure vessel surveillance capsules. They also directed the flow of reactor coolant water and provided shielding for the reactor pressure vessel.



Upper and Lower RV Internals

Segmentation of the Unit 2 reactor internals is the first phase of a planned four-phase effort that will culminate in the removal of the internals and reactor vessels from the containments of both Units. This project is critical path to the Zion Station Restoration Project and is the precursor to removing the

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Reactor Vessel Internals Segmentation Project *cont* . . .

PROJECT SCHEDULE . . .

The segmentation of the Unit 2 Reactor Internals is the first phase of a planned four-phase effort that will culminate in the removal of the internals and reactor vessels from the Containments of Units 1 & 2.

- **Unit 2 Internals Segmentation— Nov 2011 thru Dec 2012**
- **Unit 1 Internals Segmentation— Jan 2013 thru Oct 2013**
- **Unit 2 Reactor Vessel Removal — April 2013 thru Jan 2014**
- **Unit 1 Reactor Vessel Removal — Feb 2014 thru Oct 2014**

other large components in the containment buildings, such as the steam generators, reactor coolant pumps and the pressurizer.

The reactor vessel and internals are the most activated components onsite. After the various components of the internals of the reactor vessel have been segmented, the waste will be classified and placed into waste containers located at the bottom of the reactor cavity in preparation for eventual packaging and shipment to appropriate licensed disposal facilities, or for placement in one of the four Greater Than Class C (GTCC) waste dry cask storage casks that will remain on site at the dry cask storage facility.

When SNS has completed the segmentation of the Unit 2 reactor vessel internals, they will relocate their tooling to Unit 1 to start segmentation of the internals for that Unit. When this occurs, the ZS GTCC Waste Team will move into Unit 2 to perform the transfer of GTCC waste into the dry casks for onsite storage. When this effort is completed, SNS will return to Unit 2 to perform the segmentation of the Unit 2 reactor vessel. A similar program will be then be performed on Unit 1.

The contract award for the segmentation scope was made to SNS in October of 2010 following the Zion Station license transfer from Exelon to Zion*Soultions*. SNS was chosen based on their past experience on other decommissioning projects, as well as the quality they bring to the project. Several SNS key team members have been at the site for several months to support the pre-planning of the project.

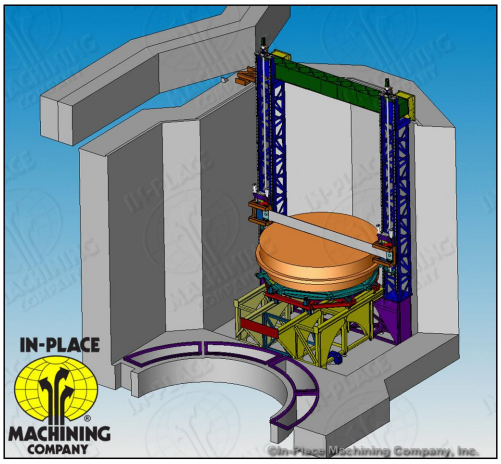

Diagram of Volume Reduction Station (VRS) in the reactor cavity.

SEGMENTATION TOOLING:

SNS evaluated various tooling suppliers before selecting two vendors, In-Place Machining (IPM) in Milwaukee, WI, and Force Manufacturing (Force) from Lake Villa, IL, to supply the four main tooling systems to be utilized on the Project. Segmentation activities will be performed in the flooded reactor cavity using mechanical cutting technologies. The planned approach is very similar to the last large internals segmentation project that took place at the Rancho Seco nuclear plant. The Zion Station Segmentation Project is more challenging than Rancho Seco due to the longer operating life of the Zion units, which resulted in greater activation of the reactor vessels and internals than at Rancho Seco.

Fabrication of Bolt Milling Tool (BMT).

IPM will supply the Volume Reduction Station (VRS) to segment the upper internals, which will be located in the shallow end of the cavity. Force will supply the Bolt Milling Tool (BMT), Circumferential Hydraulically Operated Cutting Equipment (CHORCE) and the Former attachment Severing Tool (FaST). The Force designed tools will be used to segment the lower internals in the deep end of the cavity. The VRS will also be used to further segment portions of the lower internals prior to packaging.

Each tooling system has undergone a series of Design Reviews by the SNS and ZS team members prior to the start of fabrication. The reviews focused on the engineering designs, ease of operations, ALARA considerations, blade change-outs, and safety aspects. The fabrication of the tooling systems is nearing completion to support the upcoming mock-up program.

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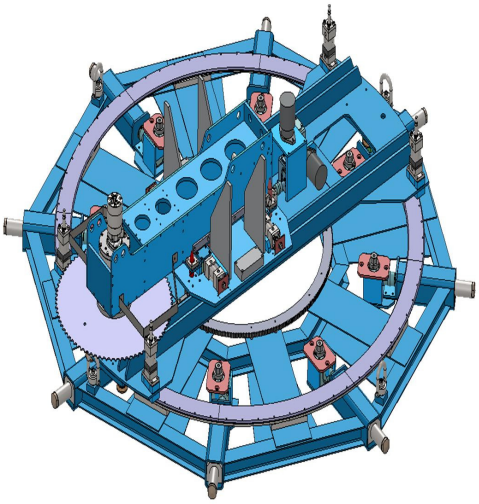
Reactor Vessel Internals Segmentation Project *cont* . . .



Circumferential Hydraulically Operated Cutting Equipment (CHORCE).

MOCK-UP TESTING:

SNS has developed a very comprehensive mock-up testing program for the four major tooling systems. In addition to a "run-up" test in SNS's subcontractor's shop under "dry" conditions, wet mock-up testing will be performed in a specially constructed mock-up facility at In-Place Machining in Milwaukee. The mock-up pit dimensions are 54' long x 25' wide by 16' deep with a capacity of 160,000 gallons. The facility also includes overhead cranes available to deploy the tooling in the pit. Each of the four main tools will be subjected to rigorous testing prior to shipment of the tooling to Zion Station in early October. The team has developed special mock-up test procedures that will be used by the SNS crew in Milwaukee.

A portion of the mock-up will be performed under "dress-out" conditions with life vests to simulate actual site conditions. Upon completion of the mock-up, the SNS crew will relocate to Zion Station to support equipment move-in into the Unit 2 containment, followed by equipment set-up and final testing prior to filling the cavity on November 9th. The SNS crew members receive their formal training on the tooling during the mock-up period. Following an initial day of security screenings for the SNS crew and their contractors at Zion Station on September 12th, Kathy Gramstad, ZS Training Department, will administer NGET training to the SNS crew and tooling vendors in Milwaukee during the mock-up effort. We need to ensure that all individuals will be badged for unescorted access prior to their arrival to the site. The mock-up testing program will be witnessed by ZS Management, the ZS ALARA Engineer, several ZS RP Technicians, and ZS Safety personnel.

Off-site In-Place Machining (IPM) mock-up tool testing and training pool.

CAVITY PREP ACTIVITIES:

Prior to arrival of the SNS equipment to the site, ZS will have completed "cavity prep" activities to ensure that sufficient space is available for the SNS equipment and all potential interferences with their equipment have been removed. These key activities are being coordinated by Mike Williams and Rob Woodard. In addition, the electrical power needs for the SNS equipment have been identified and Jerry Cook is coordinating ZS activities to ensure that power is available prior to SNS's arrival. Mark Stoddard is providing mechanical support for SNS, including ensuring that demineralized water is available. The plan is to perform a final walkdown with SNS one week before their crew and equipment arrives to ensure that the cavity and elevation 617'-0" are suitable for SNS.

ENGINEERING SUPPORT:

Engineering support has been key during the prep effort for the project. Jason Faulkner has been interfacing on the design of the Heavy Lift Rail System (HLRS), as well as the design of the support shelf for the GTCC liner baskets that will be located in the lower portion of the cavity. Tom Langdon has been involved with the proposed cavity fill system and Tim Slach has been instrumental in the development of the containment maps for the project, which indicate equipment location and SNS's floor space requirements.

EQUIPMENT MOBILIZATION:

The SNS tooling equipment will be shipped to the site via trucks following inspections by ZS Security personnel in Milwaukee. The equipment will be brought into containment utilizing the recently installed HLRS. Once inside containment, the refurbished polar crane will move the equipment either directly into the dry cavity for final assembly and testing, or to its designated storage area until it is needed. The BMT and VRS towers are several components that require special rigging considerations due to their length. ZS and SNS

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Reactor Vessel Internals Segmentation Project *cont . . .*

are working together to mutually develop the rigging plans for the SNS equipment. The SNS crew will arrive at Zion Station on October 3rd, along with the initial tooling delivery from Milwaukee. SNS mobilization, installation and testing activities are scheduled to take place right up to the planned start of cavity fill operations on November 9th.

SAFETY AND HUMAN PERFORMANCE:

The design of the tooling systems has considered the safe operation of all equipment. Additional precautions, such as having crew members wear OSHA approved life vests while working around the flooded cavity, will also be in place. This is necessary as the cavity handrail system will be removed to allow the SNS work platform free, unobstructed movement across the cavity.

Safety and Human Performance principles will be reinforced during the mock-up testing effort as well as during the entire site segmentation effort. The ZS team members will be performing "Management Observations" during both the mock-up effort as well as the on-site segmentation activities. Lyle Edinger is responsible for Safety and Human Performance activities.

Unit 2 Heavy Lift Rail System (HLRS) installation.

CAVITY FILLING OPERATIONS:

The team has designed a temporary cavity fill system that will move over 400,000 gallons of water from a refueling water storage tank to the cavity. The team has also developed the plan for moving the upper internals once a water elevation of 605'-0" has been reached during filling operations and the control rod drive lead screws are removed over a four week period. The water level will then be raised to the expected normal level of approximately 616'-0" followed by moving both the upper internals to the VRS and the lower internals to the lower internals support stand. Once cavity fill operations begin, SNS essentially "owns" the containment until cutting and packaging activities have been completed. Zion*Solutions* D&D personnel will continue to be responsible for maintaining cavity water level. ZS will also provide RP technician support throughout SNS's containment activities.

SEGMENTATION ACTIVITIES:

The experienced SNS in-containment crew will consist of two supervisors, ten technicians, an ALARA coordinator and a safety manager. All SNS team members have relevant field experience on similar segmentation projects. Segmentation and waste handling operations will be monitored via SNS's Video Monitoring System and recorded for training purposes. Team members will be capable of watching the segmentation activities via special internet connections provided by Scott Huff. The plan is to have the SNS crew work to the current ZS schedule of four, ten hour days per week. SNS will supply water filtration equipment to maintain water clarity within the cavity, as well as an underwater lighting system.

SITE SCHEDULE:

The SNS and ZS project activities are included in the ZS consolidated Station Schedule that is issued on a weekly basis by Dan Ducote. Once onsite, the SNS crew will work to the ZS schedule, and report updates on a weekly basis to Corky Hellebuyck as the other ZS Department Leads currently do. Wherever additional schedule detail is required for critical or long duration activities, the team has built in "schedule granularity" to better monitor those efforts.

LESSONS LEARNED:

The team has reviewed numerous EPRI and industry documents to collect lessons learned from previous decommissioning projects. SNS has also provided lessons learned from their previous segmentation projects. Lessons learned from other segmentation projects have already been incorporated in the designs of the Zion Station cutting tooling. The team is also recording lessons learned from Zion Station Unit 2 as the project progresses, so they can be incorporated into the Unit 1 segmentation effort.

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Reactor Vessel Internals Segmentation Project *cont* . . .

Project Team Leaders . . .

The Zion*Solutions Project Team is led by Project Manager Ken Bentley, a 35-year employee of* Energy*Solutions. Ken participated in the pre-planning of the Project, beginning with the segmentation bid proposal documents and continuing through the vendor evaluation and contract negotiations.*

Ken is supported by Deputy Project Manager, Ron Richards. Ron has extensive nuclear experience, having worked in various engineering and project management positions for Sargent & Lundy and Exelon Nuclear.

ZIONSOLUTIONS:

***Ken Bentley**—Project Manager*
***Ron Richards**—Deputy Project Manager*
***Chuck Fuller**—ALARA Engineer*
***Mike Wiskerchen**—Waste Operations Manager*
***Rob Woodard**—D&D Manager*
***Mike Williams**—D&D Support Manager*
***Dan Ducote**—Project Scheduler*
***Lyle Edinger**—Safety*
***Stan Mastalerz**—Work Planning*
***Scott Huff**—I.T. Services*

SIEMPLEKAMP NUCLEAR SERVICES (SNS):

***Bill Halishak**—Project Manager*
***Detlef Queisser**—Assistant Site Project Manager*
***Rich Warnick**—ALARA Coordinator*

IN-PLACE MACHINING (IPM):

Jonathan Eder

FORCE MANUFACTURING:

Russ Valin
Steve Larson

ALARA PLANNING:

Chuck Fuller and Rich Warnick have developed detailed dose estimates for the segmentation effort, crane operation, and RP and management support activities. They have been optimizing the dose estimate since the beginning of March. Currently, the dose estimate is at approximately 13 Rem for the Unit 2 reactor vessel segmentation phase of the project. The dose estimate worksheet will be reviewed against the time durations experienced during the mock-up in Milwaukee and any adjustments will be made. The team will present the requested dose goal to the Station ALARA Committee in early November, prior to the start of cavity filling operations.

RISK IDENTIFICATION AND CONTINGENCY PLANNING:

The team has identified over sixty project risks for the prep and implementation phases of the project. Each risk has been evaluated for likelihood of occurrence and schedule and cost impact. Owners have been identified for the key risks and mitigation planning is in progress. The team is very confident in the ability to support the start of Unit 2 cavity filling operations on November 9th.

CHALLENGE REVIEWS:

The team has already successfully completed Formal Task Challenges of the Unit 2 cavity prep program, HLRS design and installation, and the SNS prep activities for the RVI segmentation effort. An upcoming challenge of the SNS site cutting schedule will be performed following the completion of the mock-up program. The team will also conduct a "Readiness Review" prior to the arrival of the SNS crew on October 3rd.

ACTION ITEM TRACKING:

The team has compiled a very detailed Action Item List (AIL) that has been utilized since November of 2010 to identify and track issues to resolution. The list is divided into over twenty focus areas such as cavity prep, ALARA, mock-up testing, schedule, etc. Arranging the AIL in this manner allows the team to concentrate on certain areas as the need arises.

WORK PACKAGES:

ZS work package development is being performed by Tony Lukken, Stan Mastalerz and Dennis Grubb. All three have responsibilities for packages for cavity prep activities, and Stan is also responsible for developing ZS packages for the SNS onsite mobilization, segmentation and demobilization activities.

WASTE HANDLING OPERATIONS:

The various segmented reactor internal components will be verified to be either Class A, B, C or GTCC waste prior to being loaded into containers and recorded on inventory sheets. Class A, B and C waste will be shipped offsite to designated, licensed waste disposal facilities in Texas and the Energy*Solutions* facility in Clive, Utah. The GTCC waste will be stored onsite at the dry cask storage facility. At this time, it is expected that waste handling operations will be performed on the backshift so as to not interfere with SNS segmentation activities on the day shift. As the team gets closer to completing various milestones, such as performing the mock-up program and mobilizing the tooling and crew, additional updates will be communicated to site personnel via the ZS Weekly newsletter.

Ken Bentley . . .

Ken grew up in the Northwest of England about halfway between Manchester and Liverpool. He left school at age 16 and was fortunate to be taken on for a four-year apprenticeship with British Nuclear Fuels Ltd (BNFL). At Technical College, Ken took courses in mechanical engineering and eventually started work in the BNFL design office as a draftsman.

During his time in the BNFL design office, Ken worked on the development of highly active plants to support BNFL's nuclear fuel reprocessing. He also continued his studies at night school and eventually gained a sponsorship from BNFL to study mechanical engineering at the University of Salford (near Manchester).

He became involved in reactor decommissioning when he was asked to develop BNFL's first plant specific decommissioning plan and cost estimate for the company's two gas cooled "Magnox" reactors.

When the project was completed, Ken was asked to support BNFL's new U.S. subsidiary, BNFL Inc, which was providing support to Bechtel Corporation's decommissioning of the Shoreham Nuclear power plant on Long Island, NY. During 1991 and 1992, Ken worked in Oak Ridge, TN and Shoreham, NY, developing and implementing reactor segmentation and component packaging plans for the Shoreham project.

He returned to the UK in 1993 and worked at BNFL's Sellafield nuclear plant again, developing plans for the decommissioning of redundant high active facilities, but was requested to return to the U.S. in the beginning of 1994 to take a permanent position with BNFL Inc at its Denver, CO, office.

In Denver, Ken began working on Department of Energy (DOE) projects developing glovebox systems for handling and packaging Plutonium and transuranics wastes. He spent 18 months at the DOE Rocky Flats site working on the clean-up of contaminated facilities. Ken joined the American Glovebox Society and worked on its Standards Development Committee. He is a joint author of the AGS Standard on Alpha Containment Gloveboxes.

In 2004, Ken transferred from the BNFL Denver office to their Richland, WA, office to work on the Company's Hanford projects, including the transfer of highly radioactive sludge between the K-Basin fuel storage pools at Hanford.

Ken came to Zion Station in 2008 and returned in March of 2010 to head up the reactor segmentation effort.

He, and his wife, Holly, relocated from Hanford to Pleasant Prairie, WI, along with their two small dogs, Oscar and Zach. Ken is an avid photographer and astronomer. He is a member of the Lake County Astronomical Society and Photo Kenosha.

Ron Richards . . .

Ron joined the Zion Station Decommissioning Project on November 1, 2010, after previously working for Sargent & Lundy and Exelon Nuclear.

Ron began his career with Sargent & Lundy as a Mechanical Engineer and during his twenty-five years of service worked his way up to Project Manager for various nuclear projects, most notably at the Byron and Braidwood Nuclear Stations. He subsequently joined ComEd (which later became Exelon Nuclear) in their newly formed Project Management Department and worked there for ten years.

As a Senior Project Manager in Exelon's Corporate Office, Ron developed a reputation for being assigned to manage large, critical path outage projects for the Byron and Braidwood Stations, such as Power Uprates, Turbine Control System Replacements, Split Pin Replacements, Ten Year In-Service Inspections, and Pressurizer Nozzle Weld Overlay Projects.

He worked in Exelon's Project Management Department at Braidwood Station for two years before joining the Zion*Solutions* Team last year.

Ron has a Bachelor of Science Degree in Mechanical Engineering from Purdue University and is a registered Project Management Professional through the Project Management Institute. He formerly was a licensed Professional Engineer in Illinois.

Ron and his wife, Jennifer, live in Park Ridge, IL, and have two daughters, two dogs and three cats. Erica will be starting her sophomore year at Carthage College in Kenosha next month. Angelica is a freshman at Maine South High School in Park Ridge.

Ron is a big baseball fan of the 1960's. Ask him about his discovery of a 1961 statistical mistake for Roger Maris of the New York Yankees that had a monetary impact on a retired Baltimore Orioles ballplayer almost fifty years later!

Completed US Commercial Nuclear Plant RV Internals Segmentation Projects . . .

- ***Big Rock Nuclear Power Plant (MI)***
- ***Connecticut Yankee Nuclear Power Plant (CT)***
- ***Humboldt Bay Nuclear Power Plant (CA)***
- ***Maine Yankee Nuclear Power Plant (ME)***
- ***Millstone Unit 1 Nuclear Power Plant (CT)***
- ***Rancho Seco Nuclear Power Plant (CA)***
- ***San Onofre Unit 1 Nuclear Power Plant (CA)***
- ***Shoreham Nuclear Power Plant (NY)***
- ***Three Mile Island Unit 2 Nuclear Plant (PA)***
- ***Trojan Nuclear Power Plant (OR)***
- ***Yankee Rowe Nuclear Power Plant (MA)***