

# ZionSolutions Weekly Reader

Zion Station Decommissioning and Site Restoration Newsletter

Nov. 28, 2011



## **Special Edition**

### ***Major Milestone Achievement! Unit 2 Reactor Vessel Head Removal and Cavity Fill Completed! RV/RVI Segmentation Begins . . .***

We have just achieved a very significant milestone in the Zion Station Restoration Project—removing the reactor head and the filling of the Unit 2 reactor cavity! Zion Station has not had a filled reactor cavity since 1998.

It has been a year's effort to get to this point and is significant given the numerous complex activities that had to be completed. It was much more intricate than just removing the head and filling the cavity as in a normal refueling outage, given the major reconfiguration of systems and structures needed to support Siempelkamp and their Reactor Vessel Internals (RVI) segmentation activities.

What we just accomplished is no minor feat. We got to this point because of the efforts of many ZionSolutions and Exelon employees and contractors. This "Special Edition" of the ZS Weekly Reader highlights the various activities that led up to being able to fill the cavity and recognizes some of the key individuals and their contributions to achieving this milestone.

**Pat Daly**  
General Manager/ZionSolutions

***"Please enjoy  
this issue and  
congratulations  
to all those who  
have contributed  
to this effort.  
Your hard work  
is evident in our  
progress."***

There were many separate sub-projects that had to be completed prior to the lifting of the reactor head and filling of the Unit 2 reactor cavity. It was a major task to identify all of the required work activities, properly schedule them and complete the work to support the planned fill date.

It's a testament to the entire team of ZionSolutions, Exelon and various contractor personnel that the date we actually started to remove the reactor vessel head and fill the cavity coincided exactly with the planned date we projected back in April of 2011!

This is a true reflection on the amount of detailed planning performed on the entire Restoration Project, as well as the implementation of the Reactor Vessel/Reactor Vessel Internals (RV/RVI) Segmentation plan.

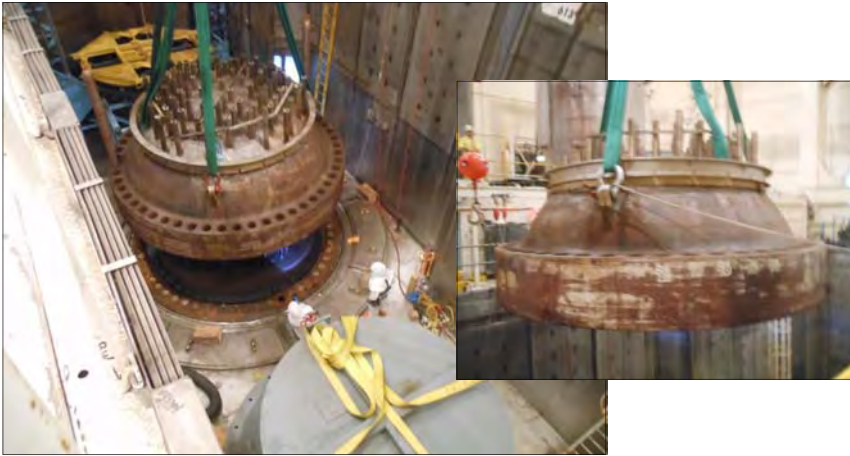
On the following pages you will find a brief description and key scopes of the various sub-projects, but most importantly, photos and write-ups of over thirty individuals and how they contributed to and supported the achievement of this goal.

We did discover several leaks in the cavity when we began cavity fill operations. The team met on several occasions and devised a solution and the leaks were repaired and the cavity was filled to elevation 605'-0" on November 23rd. Siempelkamp will begin segmentation activities today.

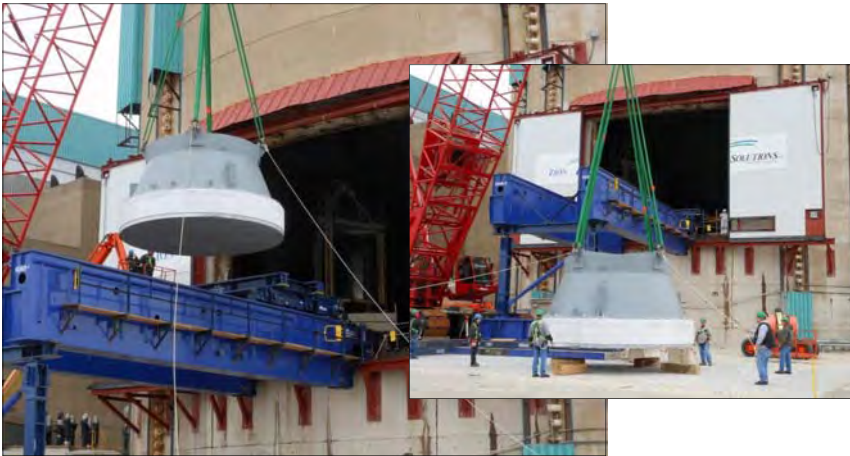
Thanks to everyone involved!

**Ron Richards**  
Deputy Project Manager  
Reactor Vessel Engineering & Segmentation

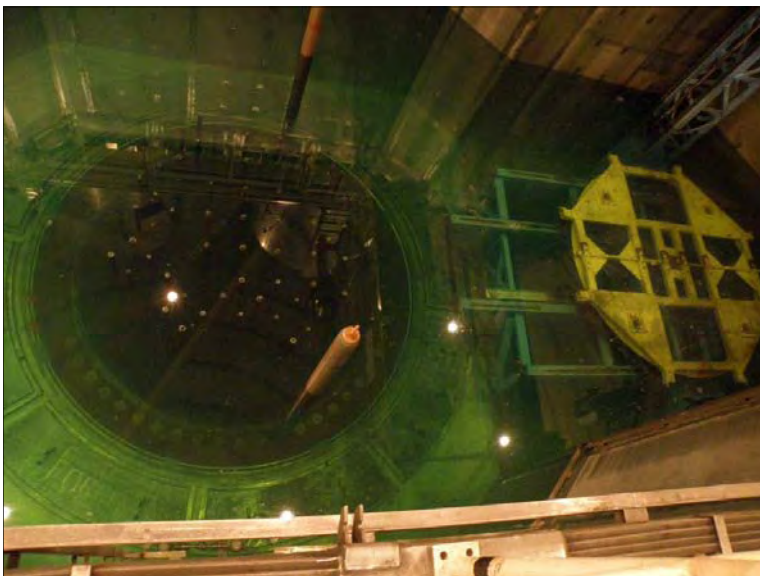
## ***Reactor Vessel Head Removal and Cavity Fill. . .***



***Reactor Vessel Head lift.***



***Removing packaged Reactor Vessel Head from Unit 2 Containment.***



***Reactor Cavity fill.***

There were no safety issues with the removal of the reactor vessel head package out of containment. The package is currently located outdoors, adjacent to the Unit 2 HLRS. The plan is to ship the package off-site to the Energy Solutions disposal facility in Clive, Utah later this week.

During the initial cavity filling operations, six leaks were identified in the cavity in the area of the new half pipe seals on the cavity floor. Kudos to Mark Stoddard, Senior Work Control Engineer, for the idea to pressurize the half pipe for leak detection, and to Terrell Brown, D&D Superintendent, for recognizing that we should use this method first to conduct the visual inspection. The necessary repairs were made and the cavity was then filled to elevation 605'0" last Wednesday afternoon.

According to Mark, it sounded like a waterfall in containment during filling operations, which was completed in just 4½ hours. The low collective dose for the inspection (183.7 mrem) and repairs (136.4 mrem) was a significant accomplishment. The entire Team deserves recognition for helping to keep this work ALARA through use of the pressurized leak location idea, and by the use of the former "neutron shield" that was part of the containment hatch. This shield was suspended from the Polar Crane and moved around the vessel between the exposed upper internals and the workers, while performing the tap and fit-up of the pressurizing rig and visual inspection of the Sandbox Covers. The shield reduced dose rates from about 100 mrem/hr to about 6 mrem/hr in the work areas.

Kudos to John Gilmore, D&D Foreman, for suggesting this shield be used in this fashion as "portable shielding."

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**Dan Ducote**, Senior Project Controls Engineer, is responsible for maintaining the ZS schedule for the entire Restoration Project, of which the Segmentation Project is a major component. Dan worked closely with Siempelkamp to merge the Siempelkamp and ZS schedules into a consolidated schedule that both organizations monitor progress against. He also ensured that all of the various tasks required to support cavity fill were properly "logic tied" and closely monitored their completion. Dan continues to monitor schedule adherence for SNS and ZS assigned activities.



Craft Foreman, **Scott Miller**, provided Heavy Lift Rail System (HLRS) crane support to the various Siempelkamp mobilization activities for the tooling and equipment.

## ***The Path to Milestone Achievement. . .***



**Containment access opening for Zion Station Unit 2.**

### **HEAVY LIFT RAIL SYSTEM:**

The Heavy Lift Rail System (HLRS) was provided by Bigge Crane & Rigging Co., however operation of the HLRS is by ZS. Prior to installation, a Formal Task Challenge was performed by Station Management. The design of the HLRS had to take into consideration the containment polar crane, which requires that a drawbridge arrangement be included in the design of the trackway to allow movement of the polar crane along its floor rails. In addition to being utilized for mobilization and demobilization of equipment for the Reactor Vessel (RV) and Reactor Vessel Internals (RVI) Segmentation Projects, the HLRS will also be utilized for large component removal of the Steam Generators, RC Pumps and Pressurizer. A second HLRS will be erected on Unit 1 later this year.



**Unit 2 Heavy Lift Rail System (HLRS).**

### **PROJECT SCHEDULE:**

ZS developed a very detailed schedule that included "hammocks" for every major sub-project and the individual tasks to perform, so we could monitor the progress of the work. Various Station personnel met every week to review the status

### **CONTAINMENT ACCESS OPENING:**

The size of the opening needed to be coordinated with the design of the HLRS and the expected size of the large Siempelkamp tooling. Concrete cutting was performed by both Demco Systems, Inc. and ZS. The steel liner plate removal was performed by ZS. The motorized doors were installed by Dan's Doors.



**Jason Faulkner** is the Civil/Structural Engineer in the Site Engineering Dept. He has been involved with the designs of the containment access facility and motorized doors, HLRS specification and design, and reviewing the GTCC shelf designs, including the emergent need for seismic restraint for the shelf. Jason also was responsible for coordinating the acceptance of the anchoring of the Siempelkamp VRS Towers to the containment structure.



**Pam Johnson**, RP Operations Supervisor, and her RP Technicians have played a key role in the RCS "Cut and Cap" effort, as well as supporting various cavity prep activities, such as the removal of the Manipulator Bridge and both phases of the CRDM cutting program. Pam is happy to be a part of the ZS team and appreciates the efforts of the Technicians that report to her.

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**Craft Foreman, Sean Corbett,** and his crew were responsible for various activities leading up to the cavity fill. As part of the prep effort they were responsible for removing cavity interferences and clearing floor space on elevation 617'-0". The crew installed the new sandbox covers and the cavity leak mitigation strip, as well as supported the RCS "Cut and Cap" effort. They also installed the cavity fill pumps in the RWST. In addition, Sean and his crew were part of the containment access opening effort.



**Roger Ankley** is a Union Electrician. He has supported the Restoration Project by running fiber optic and data cables to support Siempelkamp and ZS activities.

of work activities. The individual Siempelkamp and ZS schedules for cavity preparation and segmentation work were consolidated into a single schedule to ensure that we knew the schedule interdependencies for both organizations.

### **REACTOR COOLANT SYSTEM PIPING CUT AND CAP:**

Prior to filling the reactor vessel with water, the hot and cold leg piping connections to the vessel had to be "cut and capped." Various options were reviewed prior to finalizing the cutting approach and the necessary work activities were completed on all four loops in October. The welds were checked for leaks during the initial filling of the vessel and additional work was performed to seal minor leakage. The vessel was successfully filled and with no further observed leakage in time to support cavity fill work. The RCS "Cut and Cap" effort, which had a dose goal of 5.528 Rem, actually came in at 3.863 Rem.

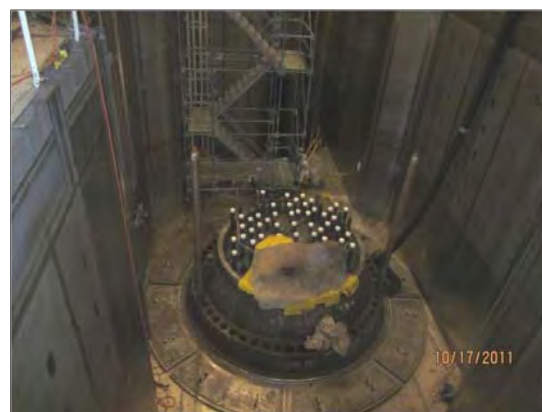


**Reactor Coolant System pipe cutting activities.**

### **CAVITY PREPARATION/CONTAINMENT**

#### **ELEVATION 617'-0" READINESS:**

A significant amount of work needed to be performed to get the reactor cavity ready for move-in by Siempelkamp. Like-



**Unit 2 Reactor Cavity ready for move-in by Siempelkamp.**

performed of the cavity prep plan in early March 2011.

wise, there were numerous components on the 617'-0" floor that needed to be removed to allow floor space for Siempelkamp's needs. A Formal Task Challenge was successfully



**Jerry Cook, Senior Work Control Isolation Engineer,** was responsible for identifying the containment electrical systems that could be isolated from the required systems. He also worked with the SNS engineers to identify their power requirements and locations and closely coordinated ZS activities to supply electrical power for the tooling and accessories prior to their arrival on-site.



**Stan Mastalerz, Planner/D&D,** was responsible for developing Work Packages that were required for the cavity prep scope, as well as the main SNS site activities. By communicating with various Station groups, he developed the packages within the required time-frame to meet the project schedule requirements. Many of the packages involved specifying work that was "first time evolutions" for many personnel.

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**Craft Foreman, John Gilmore, and his crew have been involved in many of the inside containment work activities that supported achieving the cavity fill milestone. They were responsible for removing cavity and transfer canal interferences, the erection of the cavity access system, removing the manipulator crane, and cutting up the upper internals storage stand. In the last month, the crew performed the difficult task of installing the GTCC Liner Basket Support Shelf and seismic restraint in the deep end of the cavity under high dose rate levels. John and his crew also performed the cutting of the Control Rod Drive Mechanisms off of the reactor head.**



**Tom Teasley, Waste Packaging Certifier, is tasked**



Major activities within the cavity were the erection of a cavity access system, design, fabrication and installation of new “sandbox” covers, and a leak mitigation strip. The Upper Internals Stand and Reactor Head Stand needed to be removed and a support stand needed to be designed and fabricated for the two GTCC Liner Baskets.

The installation of the support stand and seismic restraint proved challenging to the D&D crew due to space limitations in the fuel



**Move-in of Greater Than Class C (GTCC) Liner Basket Support Stand into Unit 2 Containment.**

transfer canal area of the lower cavity. There were numerous interferences within the cavity that Siempelkamp required to be removed and various systems connected to the cavity that needed to be isolated.

On the elevation 617'-0" level there were many items that interfered with Siempelkamp's planned laydown and work areas. Items such as the manipulator crane were removed from containment via the polar crane and HLRS. Electrical power requirements for Siempelkamp tooling and accessories were identified and provided.

#### **SIMPELKAMP TOOLING DESIGN AND FABRICATION:**

The tooling design effort for the CHORCE, BMT and VRS began



**Assembly of the Volume Reduction Station (VRS) Base at In-Place Machining in Milwaukee, WI.**

with the incorporation of key lessons learned from previous segmentation projects. Each Zion Station tool underwent engineering reviews throughout the design process. Upon approval of the final design, the tools were

**Tom Teasley—**with ensuring the loading of waste containers is conducted in an efficient manner. He interfaces on a regular basis with the Rad Protection and D&D personnel inside containment on loading activities. Tom visually observes container fill operations to verify that there are no prohibitive items placed into containers. He maintains loading sheets verifying the inventory of containers and verifies integrity of the containers prior to, during and following loading.

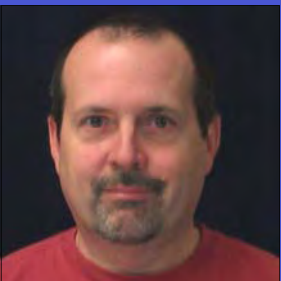


**Bruce Konkell is** the Vice-President of Engineering for In-Place Machining (IPM) in Milwaukee. He is responsible for the electrical, controls, and software design and programming of the VRS tool. He participated in various engineering design reviews for the VRS with SNS and ZS personnel and was a key contributor during the successful mock-up program in Milwaukee. Bruce and several IPM technicians recently performed final diagnostic testing of the VRS at Zion Station.

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**Mike Sutton** is a Senior Design Engineer for IPM. He is responsible for the hardware and tooling systems design and development, and program management for the VRS. To support this effort, Mike participated in walkdowns of the cavity to ensure that the VRS was designed to take maximum advantage of the cavity floor space. Mike represented IPM during the engineering design reviews of the VRS tooling and also supported the mock-up testing program of the VRS.



For Force Manufacturing, **Steve Larson** was instrumental in the design of the BMT and CHORCE tools. Wearing his Plant Decommissioning "hat," Steve was responsible for the design of the cavity



**Final "Dry" Testing of the Bolt Milling Tool (BMT) at Force Manufacturing in Lake Villa, IL.**

BMT in Lake Villa, IL. SNS and ZS closely monitored the fabrication activities to ensure they were completed on time to support the mock-up schedule.

#### **MOCK-UP TESTING PROGRAM:**

The mock-up testing program consisted of the development of the test plan followed by the generation of detailed work instructions for the CHORCE, BMT and VRS tooling.



**Lowering a Volume Reduction Station (VRS) Mock-up Test Piece into the Wet Pit at In-Place Machining in Milwaukee, WI.**



**Testing of the Bolt Milling Tool (BMT) at In-Place Machining in Milwaukee, WI.**

fabricated in accordance with a schedule to support the mock-up testing program. In-Place Machining fabricated the VRS in Milwaukee and Force Manufacturing fabricated the CHORCE and

period in September and early October at In-Place Machining in Milwaukee. A mock-up test pit was built specifically for the project which supported underwater testing

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**Steve Larson**—level measurement system, new sand-box covers, and GTCC Liner Basket Support Shelf. Steve also participated in numerous engineering design reviews for the CHORCE, BMT and FaST with SNS and ZS. He also provided installation support to John Gilmore's crew for the support shelf inside the cavity. Steve has worked on several reactor decommissioning projects and is pleased to be part of the Zion Station team.



**Horst Kwech**, Force Manufacturing, has designed field machining equipment used around the world. He currently holds 20 patents for field machining equipment. Horst supervised the design and fabrication of the BMT being used at Zion Station. It is the latest generation of several similar "Wall Mills" he has designed since the 1980's. Along with Steve Larson, Horst supported design reviews of the CHORCE, BMT and FaST. He also supported the mock-up program of the Zion Station BMT in Milwaukee.





*As Siempelkamp's Engineering Manager headquartered in West Columbia, SC, **Mike Anderson** was responsible for the development of the BMT, CHORCE and VRS tooling, which incorporated lessons learned from previous segmentation projects. He coordinated the performance of design reviews at various stages of the tooling evolution and coordinated the design and fabrication activities of In-Place Machining and Force Manufacturing. Mike also coordinated the mock-up testing effort in Milwaukee and documented the successful results in the mock-up test report.*



**Chuck Duvall** coordinated Siempelkamp mock-up test activities in Milwaukee from a →

of the tooling. All tooling performed as expected and was subsequently mobilized to Zion Station. Numerous ZS, Siempelkamp and Force Manufacturing team members supported the mock-up plan, which culminated in a post mock-up review meeting to discuss the results and collect lessons learned.

#### **DOSE GOAL:**

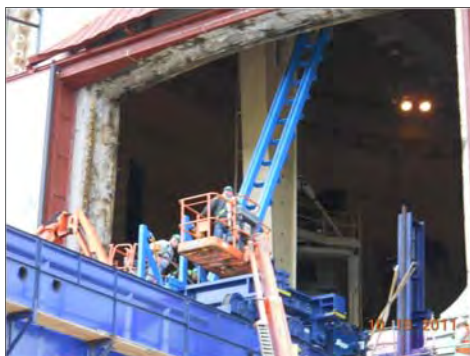
Detailed dose planning was performed for all sub-projects. In particular, a very detailed dose planning effort was performed for the Unit 2 RVI Segmentation effort for Siempelkamp personnel based upon manpower and expected dose rates in various areas of the containment and cavity. This was an iterative process performed over an eight month period by ZS and SNS team members. The Unit 2 RVI dose goal is 14.186 Rem.

#### **SIEMPELKAMP SITE MOBILIZATION:**

Following the completion of the mock-up test program in Milwaukee, the SNS tooling was shipped to Zion Station. Detailed



**Moving the Volume Reduction Station (VRS) Base into Unit 2 Containment.**



**Moving the Bolt Milling Tool (BMT) into Unit 2 Containment.**

planning was performed on the lift plans, especially for the large items such as the BMT and VRS. All items were carefully, safely and successfully moved into either the Unit 2 Containment or

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**Chuck Duvall**—Quality Assurance standpoint. He continuously recorded the status of mock-up activities, including documenting cutting times and speeds, as well as recording issues throughout the 3-week-plus mock-up effort. He also documented SNS operating training regimens and supported several design reviews in Lake Villa of tooling supplied by Force Mfg.



**Chuck Fuller's** primary focus is as the ALARA/Rad Engineer for the RV/RVI Segmentation Project. He worked closely with the SNS and ZS project team members on the project dose goal development and developing the required Radiation Work Permits. Chuck participates in project and schedule reviews to ensure any changes incorporate ALARA best practices and are reviewed against the dose goal. He recently presented the Unit 2 RVI Segmentation scope dose goal to the ZS Station ALARA Committee and received their approval.



*Craft Foreman, **Don Roszak**, and his crew were responsible for moving the large Siempelkamp tooling into containment utilizing the specific rigging plans that were developed for the large tooling. Don ensured that move-in activities were closely coordinated between the outside and inside containment teams. He and several of his team members also participated in the mock-up effort in Milwaukee to inspect the equipment before it arrived on-site and discussed the rigging plans with the tooling designers.*

*Don's crew also moved other items into containment for Siempelkamp, such as the Segmentation Bridge and miscellaneous items and the two Greater Than Class C (GTCC) Liner Baskets and Support Shelf.*

*Don also participated in the planning of the HLRS with Bigge Crane & Rigging Co.*

the Turbine Building (for storage until needed). The team had to deal with poor weather conditions, such as rain and high winds during move-in activities, but always placed the safety of employees at the forefront of project activities.

### **REACTOR VESSEL HEAD LIFT AND PACKAGING:**

Prior to filling the reactor cavity, the reactor vessel head had to be lifted off of the vessel and "packaged" for shipment to the Energy Solutions Clive, Utah, disposal site. ZS Waste Operations coordinated the design of the "tophat" packaging system, which has been used at other facilities. The approximate 26-ton packaging system recently arrived on-site and was moved



***Transporting the Reactor Vessel Head container to the Unit 2 Heavy Lift Rail System (HLRS).***

into containment to accept the vessel head. ZS personnel performed several cutting evolutions on the Control Rod Drive Shafts to ensure that the vessel head could be "cleanly" lifted off of the vessel. Once the head was packaged (the weight of the packaging system was about 115 tons), we continued with filling the cavity to elevation 605'-0" to allow Siempelkamp to begin segmentation work.

### **CAVITY FILL:**

A fill system was designed by the Zion Engineering Group to pump water from a Refueling Water Storage Tank (RWST) to the Unit 2 reactor cavity. The pumps, piping and electrical control system were installed by D&D personnel. A special Station procedure was developed to control the filling and draining of the cavity. A portion of the lower cavity was filled prior to the main flood-up effort to ensure that the fill system was functional. During RVI segmentation activities, the normal cavity water level will be at elevation 616'-0". We required approximately 360,000 gallons of water to be pumped from an RWST into the cavity.



*GTCC Supervisor, **Diana Fried**, was responsible for coordinating Greater Than Class C (GTCC) Basket Liner activities for the Fuels Group, including the receipt inspection effort and move-in of the liners to the Turbine Building until they were required to be moved into containment.*

*Diana also keeps in close contact with the RV/RVI Segmentation Team to ensure that schedules for both groups are integrated and that her group will be ready to move into Unit 2 containment to remove the GTCC waste once the Siempelkamp RVI team has completed their Unit 2 RVI scope and moved over to Unit 1 in late 2012.*

*The filled GTCC liner baskets will be placed into stainless steel containers and sealed. The containers will eventually be stored inside concrete casks at an onsite dry cask storage facility.*

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**Iron Worker, Luke Wessel** is assigned to Don Roszak's rigging crew and supported all of the equipment and tooling lifts and move-ins for the Siempelkamp components, as well as the GTCC Liner Baskets and support shelf. He also participated in the mock-up testing program in Milwaukee to ensure that rigging requirements for the large tooling were developed prior to the tooling arriving on-site. Luke was also involved with the RCS "Cut and Cap" effort.



**Tom Langdon, Mechanical Engineer**, has been involved with the Zion Station Restoration Project since May 2008 as one of the first engineers



**Preparing for the Test Fill of the Lower Cavity in Unit 2 Containment.**

#### **SUPPORT ACTIVITIES:**

Often overlooked on large projects is the work performed by "unsung" team members on behind-the-scene activities, such as contract management, administrative functions, training, and even safety compliance. All of these groups played a key role in our success. Contract management is necessary to enforce contract requirements with contractors. Training is necessary to ensure personnel are properly trained to perform work. We chose to train the Siempelkamp crew earlier than originally planned to ensure they would all be badged before site mobilization. Safety is also a crucial part of every activity as we need to make sure that "everyone goes home at night." And, of course, where would we all be without administrative support!

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**Craft Foreman, Mike Mabbett**, and his crew are primarily involved with work "outside" the double security fence. They have supported the various activities with getting equipment from the warehouse and the North Gate to the Heavy Lift Rail System (HLRS) for movement into containment. There have been numerous instances where emergent equipment deliveries needed to be closely coordinated. Mike is honored to be recognized in this newsletter, but stresses that his crew, as well as Rad Protection and Security, deserve the accolades.

**Tom Langdon**—assigned to the RV/RVI Segmentation Project. Along with Don Roth, he helped develop the original procurement specification for vendor services and contributed to the vendor selection. Most recently, Tom was involved with the design of the reactor cavity fill system and modifications to the containment ventilation system.



**Mark Stoddard, Senior Work Control Isolation Engineer**, previously worked at Zion Station from 1984 through 1998 for ComEd/Exelon, with his last position being a SRO. Mark was a key participant associated with the mechanical isolation activities for the containment building. He also identified cavity interferences and components required to be removed from the elevation 617'-0" floor to free up space for the Siempelkamp equipment. Most recently Mark was responsible for developing the procedure for filling and draining the reactor cavity.



**Electrical Foreman, Dave Mason**, is a Union Electrician and supervises a crew of electricians. The crew was responsible for providing the electrical power for the Siempelkamp tooling and equipment prior to their mobilization.



**Operating Engineer, Tracy Rubo**, is assigned to John Gilmore's crew and supported various rigging activities, as well as the installation of the GTCC liner baskets and support shelf in the reactor cavity.

**Frank Dowell**—Nuclear Mechanic in Exelon's Maintenance department. He developed the plan for pinning of the containment purge valves to support the containment preparation effort.



**Laborer, Art Hernandez**, participated in the RCS "Cut & Cap" effort, as well as welding in the new sandbox covers inside the reactor cavity. He also worked on cutting the containment liner plate following removal of the containment exterior concrete wall.



**Chuck Nelson**, Training Supervisor, is responsible for ensuring that the ZS Staff and contractor personnel receive the proper training to the various plant programs. Chuck and his staff supported the recent NGET activities for the Siempelkamp personnel in Milwaukee during the mock-up effort and continues to ensure that any additional training requirements for the Siempelkamp crew are identified promptly and performed to support the site segmentation schedule.



**Teamster, Tim Krauss**, was involved with developing the transport system for the GTCC Liner Baskets.



**Ironworker, Dennis Quinn**, was involved with the RCS "Cut & Cap" program. He also supported the new sandbox cover work, the new containment access doors and the transport system for the GTCC Liner Baskets.

**Certified Industrial Hygienist, Lyle Edinger**, is one of the six "Stakeholders" of the RV/RVI Segmentation Project. He is responsible for ensuring that the project safety documents are implemented as written. His role in the cavity preparation work, along with the rest of the ZS Safety Department, has been to help D&D perform the work safely. They review the work plans, participate in pre-job briefings, walk down the work area with the planners and supervisors, and are present during much of the work to advise on safe work practices. They also monitored air contaminants generated by the cutting and welding work.



**Jim DeNio**, Exelon Maintenance Supervisor, coordinates all of the Exelon Maintenance activities for the Zion Restoration Project.



**Frank Dowell**, Exelon Mechanical Maintenance, is a



**Johnnye Henry**, Senior Subcontracts Administrator, is responsible for administering the Siempelkamp contract, which includes performing contract changes, authorizing payments, and any modifications to the terms and conditions. She also administers other contracts for the Zion Restoration project.



**Sr. Administrative Assistant for D&D/Construction Support, Stephanie Marsh** is the administrative assistant for all of D&D. She's responsible for supporting the various D&D Managers and staff, including generating requests for visitor and unescorted access, entering Corrective Action Reports, supporting Formal Task Challenges and Internal Team Challenges and Focused Self Assessments, and facilitating various meetings.