

WM '07 Conference, February 25 – March 7, 2007 Tucson, AZ

## **Determining the Appropriate Package and Transportation Methodology for the Detroit Edison, Fermi II Msrs and Associated Components**

B. Weber  
Detroit Edison Company/Enrico Fermi II Nuclear Power Station  
6400 North Dixie Hwy, Newport, MI 48166  
USA

S. Dempsey  
MHF Logistical Solutions  
685 Emory Valley Rd, Suite B, Oak Ridge, TN. 37820  
USA

### **ABSTRACT**

During the spring of 2005, Detroit Edison, Enrico Fermi II Nuclear Power Station (Fermi) decided to disposition two MSR's and associated components scheduled for replacement in the spring of 2006 during the MSR Replacement Outage. Of concern to Fermi was the proper packaging and transportation methodology when dispositioning a component measuring approximately 110' in length and 13' in diameter and weighing over 300 tons. Upon removal from the Turbine Deck the retired MSR's and associated components were turned over to the Rad Waste Group for packaging and final disposition.

Fermi requested quotations from vendors to package, transport, and disposition the MSR's and associated components. However, multiple Vendors informed Fermi that the size and weight of the MSR's were questionable in passing permitting requirements and would require segmentation and volume reduction on site or at a waste processor.

Fermi contracted with MHF Logistical Solutions (MHF-LS) based on their ability to receive clearances for shipping the MSR's in one piece via two heavy haul rail conveyances acting as a bolstered load with professionally engineered blocking and bracing configured to support the retired MSR's.

### **History Overview**

Detroit Edison identified that the MSR's were not operating efficiently due to the moisture separator material type of steel wool. The steel wool had degraded over twenty years of operating life and was deteriorating and losing efficiency for producing steam quality. As a result Detroit Edison elected to purchase replacement internals and scheduled the replacement evolution during a future outage. However, plant extensions and Power UpRates became a reality in the industry and Detroit Edison elected to complete a full MSR change out in anticipation of potential future events of a full Power UpRate.

### **Project Overview**

The original project scope was to manufacture 4 MSR halves, deliver the halves to Fermi, and assemble the halves on the turbine deck during the 38 day, Refueling Outage 11 slated for

WM '07 Conference, February 25 – March 7, 2007 Tucson, AZ

March/April of 2006. The intent was to remove the retired MSR's in the same fashion and disposition the components and associated material at either a licensed waste processor or disposal facility.

However, the critical path schedule for the outage increased significantly when assembling two new MSR's and segmenting two retired MSR's and Detroit Edison elected to approach the project based on receiving and removing complete MSR's assemblies with no assembly or segmentation required.

### **Approach to Work**

Detroit Edison issued a contract to MHF Logistical Solutions, Inc. (MHF-LS) to provide all services to completely disposition the MSR's and the associated components. This included all technical services, packaging, blocking and bracing, final securement, transportation, satellite tracking, and final disposition. Detroit Edison selected MHF-LS based on the company's ability to move the MSR's intact and with the mirror insulation in place. The MSR's measured 110' long and 13' diameter, weighed 300 tons, and radiological levels of < 5 mR contact dose rates and < 500 dpm smearable contamination levels. This approach to the project allowed Detroit Edison to dramatically reduce the critical path time frame. Additionally, MHF-LS received, packaged, and transported eight bellows and 8 reducers plus all miscellaneous wastes associated with the MSR replacement outage. The MSR's and Wastes were transported via dedicated rail cars and where monitored daily via the MHF-LS satellite tracking system.

During the preplanning meetings and the new MSR receipt process, it became clear that handling the retired MSR's in an intact configuration posed a significant risk to Detroit Edison. Several meetings were conducted between Detroit Edison, the replacement contractor, and MHF-LS to determine the packaging and transportation options offered by MHF-LS in an effort to eliminate as much risk as possible. Eventually, Detroit Edison and MHF-LS agreed on having the retired MSR's segmented in half but left the insulation intact.

MHF-LS designed, fabricated, and installed blocking and bracing that allowed for live loading of the rail cars in the Turbine Bay and final securement in the staging area. MHF-LS also designed and fabricated specialty, soft sided SCO wraps to package the MSR's as the Halves were removed from their plant location. MHF-LS transported the MSR's from the Plant located in Newport, Michigan to the EnergySolutions facility in Clive, UT,--a distance of more than 1,700 miles--without incident. The total activity levels for the MSR's ranged from 1.263E+03 MBq to 1.689+03MBq. With a combined weight of more than 1.2 million pounds, the units were transported by MHF-LS via a flat deck rail car. MHF-LS developed a turnkey program to package, transport, and disposition the MSR's and associated material. The program included pre-planning activities and submittals; mobilization of personnel and equipment; transportation; and final disposition in Clive, UT.

In addition to the onsite package preparation work, MHF-LS prepared packaging and transportation plans that met stringent security and safety standards for the shipments. MHF-LS was also responsible for completing railroad clearances prior to the rail movement to ensure that the MSR's would move throughout the designated route without delays caused by pinch points.

WM '07 Conference, February 25 – March 7, 2007 Tucson, AZ

As an additional security and tracking measure, MHF-LS installed GPS units on the rail cars transporting the MSR halves enabling us to perform real-time tracking of the conveyances while in transit. Instrumentation packages containing a satellite antenna, GPS receiver, and long-life battery were secured to rail cars. These instrument packages were programmed to independently send location reports twice daily and could be queried for location as required.

### **Key Features of the Project**

- Technical Services, Packaging, Transportation, Real Time Satellite Tracking, and Disposition of a first of it's kind project during critical path activities
- Design, Fabrication, Installation, and Securement of the MSRs with specialized blocking and bracing
- Coordination of live time Rail movement of over-dimensional nuclear reactor components during a nuclear power plant refueling outage
- Turnkey logistics services associated with cross-country movement of 1.2 million pounds of materials
- Design and installation of a complete packaging and blocking and bracing system to ensure safe and compliant transport of the MSRs
- Critical Path Schedule Maintained
- No Lost Time or Injuries
- No Packaging or Shipping Violations
- Seamless Transition Between MSR Replacement Project and Radwaste and all support Vendors

The original scope of work for this project was to move the two MSRs intact, (each measuring over 102' in length and over 13'7" wide). Because the MSRs were covered in insulation and cladding, and due to schedule and cost constraints, Fermi was not able to remove these materials to reduce the width of the pieces. MHF-LS proposed a solution that involved segmenting each MSR into two pieces, thus, creating four smaller, more manageable pieces for the movement. By reducing the overall length of the components by half, MHF-LS was able to increase the clearance envelope with the railroad and ship the pieces with the insulation intact. MHF-LS, in conjunction with Fermi, was able to develop a plan that encompassed designing, fabricating, and providing four heavy duty flat railcars and steel blocking to secure the four MSR halves onto the railcars for shipment to the disposal location. This work-around was accomplished on a short time frame to keep the project on track with both schedule and budget.

### **ADVANTAGES OF RAIL TRANSPORT**

Shipping the retired MSRs and associated components via a private rail route enabled Fermi to recognize a secured and monitored travel path from Fermi to EnergySolutions. This method lowered the risks normally associated with over weight and over dimensional public highway shipments. Fermi also eliminated the additional costs required to segment and package the retired MSRs as well as eliminated the internal costs attributed to the control of potential radiological contamination due to the actual segmentation and packaging.

### **BLOCKING and BRACING**

WM '07 Conference, February 25 – March 7, 2007 Tucson, AZ

The B&B was designed based on professionally engineered drawings and American Association of Railroads and Department of Transportation requirements for shipping over weight, over dimensional and radioactive loads. The B&B was pre fabricated and installed on the railcar upon arrival onsite.

### **SEQUENCE OF EVENTS**

MHF-LS coordinated the delivery of four heavy duty rail cars, packaging, securement of the retired MSRs and associated components, complete shipment, and disposition at EnergySolutions, including all the required interaction with the applicable railroads and the daily tracking reports.

### **CONCLUSION**

Fermi through MHF-LS completed a first of its kind shipment when moving the retired MSRs via rail. Fermi supported the alternative approach and produced a safe, cost effective, and reliable solution.