Success In Commissioning A Key U.S. Radioactive Waste Burial Site Through The Technical Support Of Dufrane Nuclear Shielding Incorporated (DNSI) - 15476

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ABSTRACT

With the "phase out" of the South Carolina based Barnwell Radioactive Waste Burial Site, and the stockpile and storage of radioactive waste and irradiated components throughout the U.S. Nuclear Industry for decades, the opening of the Texas Low-Level Radioactive Waste Disposal Compact Facility by Waste Control Specialists (WCS), is a game changer in solving this industry-wide issue. For the first time in decades, generators now have the opportunity to send their waste to a site specifically designed to permanently sequester the waste in a licensed facility that will protect public health and the environment, better than any built to date. As history has shown through the many decades of the U.S. Commercial and Federal Nuclear Industry, site operators and management have relied heavily on contractors and vendors with exceptional expertise and decades of experience to achieve success and meet their goals. The commissioning of WCS was no exception as DNSI was contracted to design, develop, build and deploy a major component required for the opening and successful operation of the WCS site. This component, being the Modular Concrete Canister (MCC), is the "work horse" of the site. With its enormous size, weight and strength, it provides many functions that meet and comply with the site performance assessment (PA) under 10 CFR Part 61, the site WAC, and Texas Low-Level Radioactive Waste Disposal Authority. Offsite contracting the production and delivery of this critical component was a major step toward success in meeting schedule and cost for the much needed opening of the Texas Compact and Federal site. In selecting a shielding vendor, WCS partnered with a U.S. Nuclear Service company with over 30 years of experience which spans the entire U.S. Commercial, Federal, and Nuclear Industry. The task given DNSI was not a simple one, it involved every aspect from start to finish of the design, production and delivery of rectangular, cylindrical and "irradiated hardware" (IH) MCCs, that could accept waste up to 100 Sv /Hr contact dose rates. The enormity of this project was quite clear and required extensive quality control, construction of batch plants, purchase of huge quantities of

raw materials, setting up a production site in a neighboring city, relocation of personnel from company headquarters, and safely transporting 8,000 Tons of MCC components 75 miles one-way on West Texas highways daily. Most important of all, this was accomplished safely with no incidents, no component failures or rejects, and on schedule. The start of receipt, of "in-compact waste" and "out-of-compact waste" was conducted virtually in a 3 month period time span. To help guarantee success and quality of product, all forms had surfaces machined, heavy duty elastomer coatings were applied to concrete surfaces, only galvanized anchors were used, and the batch plant was run to strict ASME standards thus testing every 50 cubic yards of concrete poured. With significant teamwork and success from Vendors such as DNSI, WCS and the Texas Compact has evolved as one of the leading radioactive waste sites in the U.S. and the world, providing safe, secure and compliant permanent waste disposal services by using technical expertise and innovation of the highest standards.

INTRODUCTION

In providing a high level of specialized support, A vendor usually matures over decades of industry experience thus expanding their capabilities to better serve the client. An example of this is the recent evolution of Dufrane Construction Inc., a division of DNSI, which now plays an important part in building and transporting heavy shield components that normally wouldn't be in the business plan of a small to mid- size Nuclear Industry Vendor. When this nuclear expansion takes place, a company needs to have readily available inventories of raw materials, and provide a source of finished components and equipment needed to complete even the largest nuclear engineering projects. To provide the highest level of support, a highly trained and specialized work force needs to be available to mobilize for any emergencies or critical path jobs. Small businesses, especially in technology fields, have to know when expansion is necessary or advantageous and follow through to better serve the customer. Examples of this small business environment are widely found throughout the U.S. Nuclear Industry, and the many innovative vendors that serve it. A reliable and technically capable support vendor doesn't evolve though without exceptional experience in the industry it supports.

A successful vendor is judged carefully regarding length of time it has been in business, and the number of industry events that have called upon the technical vendor to help solve complex problems for utilities and other large customers. Examples of such events include Three Mile Island (TMI) and the "post accident sampling systems" that had to be designed, built and commissioned quickly following this historical event. Fukishima is another example, decades later, requiring huge support from highly experienced vendors to address the safety issues of an event of this magnitude, and help ensure the continued safe operation of a vital industry. This support and demand from specialized small businesses has never been more important than it is today, not only from "post accident" responses and modifications, and staffing shortfalls, but also to meet the current technical worker staffing issues due to a large number of retiring skilled craft "baby boomers". Vendors are meeting these demands with highly experienced and skilled

personnel and engineers kept on staff to support Nuclear Power, Federal Facilities, and some of the most complex Laboratories in the U.S. Nuclear industry. Nuclear shielding is a prime example of implemented vendor developed solutions. Examples of some of the key shielding components that have been developed and installed industry-wide would include:

- Spent filter handling systems with remote operating tools
- High density concrete shield wall modules and roof beams for LLRW storage facilities
- Spent filter transfer shields, constructed of lead and encased with steel
- Irradiated hardware containers (IH-MCCs) with added high density concrete and steel
- Block-wall TM
- Drum shields
- Equipment hatch shields
- Filter handling systems (shielded)
- Head stand shields
- High density concrete bricks
- Liner centering guides
- Neutron shielding
- Custom pipe shielding
- SAM-9 shields
- Frisker cave
- Secure Environmental Containers (SECs)
- Security barriers
- Shielded source cabinets
- Transfer bells
- Turbine deck shields
- Wall modules
- Water shields, and window water shields
- Radioactive waste burial shields
- Rebar manufacturing and supply for shield applications
- Modular water shields
- Sample storage shields and cabinets
- Hatch shields
- Lead blanket structures and racks
- Interlocking polyethylene barriers
- Louver shields
- Onsite 3-D scanning
- Outage shield packages

Photo No. 1 – WCS Federal Facility with rectangular MCCs in the background ready to be loaded.

Another vendor designed and manufactured shielding item that has been a great support to the large U.S. Nuclear Power Industry is the “Reactor Head Stand Shield”. A large number of these have been delivered to Nuclear Utilities for use during their plant outages. Materials of construction and their configurations are varied. Usually included are stainless steel water shields, concrete segments, concrete ball/socket modules, and segmented designs of lead encapsulated within stainless steel or painted carbon steel. Each assembly is designed to suit the customer’s specific needs, and has a unique design, incorporating site specific requirements. Typical components include:

- Hinged access doors
- HEPA inlet / outlet penetrations
- Air sample penetrations
- Plugs for all penetrations

The shields consist of four or six segments to create diameters ranging from 13’-0” to 14’-6”. Interface at the vertical seam between segments is stepped or angled to eliminate streaming and minimize personnel dose rates or keeping exposure ALARA, the ultimate goal in using any shielding device. The cross sections through the shield walls are usually constructed of 1 ¼” to 2” lead, encased within ½” thick carbon steel shells. These cross sections provide 1.8” to 2.6” of lead equivalent shielding depending on the design. The vendor will typically work closely with the Site ALARA Coordinator and Engineering Group to assure the best design for each application.

CONCLUSION

Success as seen throughout the U.S. Nuclear Industry, has never been more evident than it is today. Utilities are experiencing capacity factors higher than anytime in the history of commercial nuclear power. Federal facilities including Army Corps of Engineers FUSRAP sites are being decommissioned, remediated and cleaned up in record time, and implementation of safety and ALARA measures throughout the industry is at its highest level. To accomplish this, "teamwork" has been extensively used by large organizations and specialized small business vendors like DNSI. The success at WCS, and components such as the MCCs that helped guarantee that success, are the result of dedicated efforts of companies that can provide QL-1 products and service, highest level of safety measures, cost effective / competitive services and products, work schedules meeting the customer's critical path needs, and verbatim compliance with state and federal regulations. The business contract DNSI had with WCS in producing the critical MCC components is a key example of this business culture and the great success that it has brought and will continue to do so.