

Spray-on coating upgrades tank-farm process pits

Becky Curtis, CHG

CH2M HILL Hanford Group is applying a substance similar to a spray-on truck bed liner to make upgrades to tank-farm process pits safer, easier and less costly.

Polyurea is a two-part sprayable coating that is being used to provide a liner in concrete tank-farm process pits. These pits are often contaminated because they contain valves, pumps and other equipment used to transfer radioactive waste in and out of Hanford's tanks. The pits are only opened when necessary to reduce risk of spreading contamination to the environment and employees, and because it is very costly to do so.

Over the decades since they were built, some deterioration has occurred. Now the pits must be cleaned and refurbished in preparation for future waste transfers to the planned vitrification plant.

"The driving force behind the use of polyurea is the need to protect our employees by keeping their exposure to radioactivity as low as reasonably achievable," said Denny Newland, CHG deputy vice president of projects. "But polyurea also benefits us by protecting the environment and saving time and money."

Fissures in the concrete pit walls have always had to be ground out, sanded, grouted, sealed and recoated with epoxy to renew secondary containment. Application of polyurea replaces much of this time-consuming procedure, saving money and protecting employees by reducing the duration of work performed in radiation areas. Unlike epoxy — which hardens with age and exposure to radiation — polyurea is elastic and has high tensile strength. It can be sprayed to stretch across gaps and seal pit surfaces providing a durable, abrasion-resistant barrier to the environment.

Another reason for using polyurea is that, when it is applied with precision, a smooth surface can be formed that can be decontaminated easily. Polyurea is harder to apply than epoxy because two streams of substance are combined as they exit the spray nozzle and form a compound that gels in about 15 seconds and is tack-free in one minute.

"You hate to use the word 'cure-all'," said Rob Mauser, the Los Alamos Technical Associates engineer who did the feasibility analysis of polyurea for CHG, "but when you consider the excellent physical properties and the chemical resistance of polyurea, and you understand the hostile environment in which we are using it, this product is as close to ideal for us as is currently available."

To prepare for this first use of polyurea in the field, Fluor Federal Services and CHG painters were involved in a weeklong training session at the Volpentest HAMMER Training and Education Center pit mockup training facility in



Process pit in AW tank farm



Process pit after polyurea liner has been applied

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February. While at HAMMER, the painters were able to develop some painting and masking techniques as well as gain some knowledge of how polyurea sets up and cures. Project leaders plan to develop a comprehensive training program for painters that will culminate in polyurea application certification. This certification is a 40-hour course designed to teach everything from troubleshooting and general repair of the equipment to advanced spray techniques.

“The level of commitment to this effort by Fluor Federal Services painters was unparalleled,” said Mauser. “Doug Hunt and Dave Foster have pushed polyurea from the beginning. They were excited about learning to apply this substance, and they have worked overtime and graveyard shifts to get the job done.”

The first two pits that were sprayed are located in AZ Tank Farm in the 200 East Area. FFS painters were responsible for pre-application preparations. Concrete and metal surfaces in the pit were scored with a grinder or a needle gun so the polyurea would adhere properly. Pieces of equipment that should not be coated, such as nozzles, were carefully masked-off because polyurea, once sprayed, hangs on tight. Then the pit was fogged with polyurea to fix any contamination, and FFS applied the substance a minimum of 1/8-inch thick onto the pit walls and 1/4-inch thick on the floor. In the first pit, fogging and application took only two hours.

“Polyurea application on the first pit went more quickly and smoothly than we had expected,” said deputy project manager Tarik Choho of Numatec Hanford Corporation. “Since this was a first-time application of a technology that is new to us, we were quite pleased with the results.”

Lessons learned on the first job were applied to the second pit in AZ Tank Farm and the third pit in AW Tank Farm. Pre-spraying preparations were streamlined in many ways. For instance, FFS painters suggested that the needle gun, which uses a set of rapidly hammering blunt “needles” to rough-up surfaces, could be made more efficient by using sharp needles. The idea was implemented and proved to save valuable schedule time and to reduce contamination hazards by generating less dust.

“The highlight of the job was the close coordination and cooperation among all of the crafts to work the plan,” said construction lead Nancy Butler. “The Fluor Federal Services/CHG team is chock full of winners with the right attitude — ‘safely get the job done.’”

“This team set an example for others in perseverance, high quality, safety and performance,” said Rick Raymond, CHG vice president of projects. “The integrated efforts of everyone including subcontractors, union workers, management and many others outside this project made it an honor to work with this team.”

The three tank-farm process pits that have been sprayed with polyurea are just the beginning.

“Thirty-two additional pits are scheduled to be upgraded starting in fiscal year 2002,” said Ken Jordan, project manager for tank-farm infrastructure upgrades. “Depending on the condition of the pit, use of polyurea coating as secondary containment could save the River Protection Project as much as several hundred thousand dollars per pit.” ♦

Versatile coating has many uses

The technology behind polyurea is about 15 years old. The coating is used for a variety of purposes here at Hanford and around the world. CHG recently applied a different formulation of polyurea in the 244-AR Vault to contain loose contamination so that personnel needed much less protective equipment to enter the facility and perform stabilization activities. The substance was also used by CHG to coat a retention basin for a caustic storage tank. DOE’s Savannah River Site uses polyurea for roofing. The Dallas-Fort Worth Airport used polyurea on decking in its parking garage. America’s largest engineering project, Boston’s “Big Dig,” used polyurea to coat the outer walls of tunnel sections for watertight integrity before sections were sunk into place and positioned under the harbor. The new Incheon International Airport in Korea, which was built on reclaimed tidal land, also used millions of gallons of polyurea coating. ♦