

EPRI Develops 3D Job Planning and Dose Estimation Prototype

EPRI is integrating a three-dimensional radiological algorithm with commercial imaging platforms to develop a tool that will help plan nuclear plant outage activities and minimize worker dose.

Nuclear plant radiation surveys are used by the radiation protection group to develop worker dose estimates, establish control measures, and brief workers on the radiological conditions they will encounter when entering the work environment. These surveys, however, are usually limited in scope, confined to two dimensions, and provide little information about dose variations with elevation. Using a variety of advanced technologies, three-dimensional information can now be estimated to enhance the value of typical radiation surveys.

EPRI has developed a subroutine using the three-dimensional aspects of radiological conditions to estimate dose rates for locations where workers will be standing. The subroutine is not a standalone application; its full benefits will be realized when it is integrated with third-party simulation software packages.



The project team – comprising EPRI, utility experts, FIATECH, and several software vendors – has developed three versions of a 3D imaging-based prototype for accurately planning work and estimating worker dose. The 3D imaging platforms in these prototypes incorporate the EPRI dose rate algorithms, which use precise worker positions, task durations, survey data, and technician knowledge of areas with sources of radioactivity to estimate the dose rates and dose for various work activities. The EPRI algorithm is intended for use with traditional survey or real-time dose rate data and mild to significant dose gradients. EPRI validated the algorithm in a 2011 pilot-scale demonstration using data from a Midwest nuclear plant, and more recently, the 3D software vendors validated the integration of their individual products with the algorithm.

EPRI coordinated a full-scale demonstration of the combined algorithm and vendor products at the same plant in early March of this year. Each 3D vendor used the same plant maintenance task – replacing a residual heat removal system valve – and worked with plant staff members to re-create the planned task and estimate durations and dose. In addition to showing the work planning module, the vendors presented additional options for using their tools to support other plant programs and processes. Other utilities attended the demonstration to observe and provide feedback to the vendors.

Additional adjustments will be made to the EPRI algorithm based on the full demonstration scenario and from feedback received during the meeting. The final version of the algorithm, along with the appropriate documentation, will be available later in 2012 for public use by interested parties. Each of

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the participating vendors is seeking a host plant to facilitate further development and testing of the prototype in preparation for commercial application.

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