EPRI Software Tool Saves Additional Substation Containment Costs for Duke Energy

Utility substations must have comprehensive Spill Prevention, Control and Countermeasure plans to ensure that transformer oil spills will not reach nearby waterways.

Duke Energy has more than 200 substation sites in Indiana. One of the biggest challenges at these sites is ensuring adequate containment measures are in place so that oil from the substation will not travel to—and potentially contaminate—nearby waterways. Duke Energy was in the process of updating its Spill Prevention, Control and Countermeasures (SPCC) plan for one of its Indiana substations, and had determined that the gravel and deep soil surrounding the substation would provide necessary containment if an oil spill occurred. The Indiana Department of Environmental Management (IDEM) disagreed and suggested that additional containment measures were required. Duke Energy used EPRI's Mineral Oil Spill Evaluation System to simulate numerous oil spill scenarios at the substation. The reports generated by the software confirmed the utility's internal assessment that there was minimal risk of oil from the substation reaching the waterway. EPRI's oil spill software is a respected and widely-used tool throughout the electric utility industry and after reviewing the data, the IDEM was convinced that the substation had adequate containment in place. Duke Energy avoided at least $20,000 in retrofit costs at this particular substation, and plans to use the software to supplement its SPCC plans at other Indiana substations as necessary.

EPRI's Oil Spill Evaluation Tool Confirms Duke Energy's Substation Containment Assessment

Duke Energy is one of the nation's largest electric utilities, providing power to four million customers in five states. Its large electricity infrastructure includes hundreds of substations. Most of these substations must have an SPCC plan in place to demonstrate to regulators and other stakeholders that if an oil spill occurs, there are adequate measures to ensure the oil will not travel to and potentially contaminate nearby waterways. Duke Energy was in the process of updating the SPCC plan for one of its Indiana substations when IDEM was onsite inspecting one of its power plants and decided to inspect the substation as well. Duke Energy had performed a comprehensive internal assessment of this station's containment measures and had determined that the gravel and deep soil surrounding the substation would provide necessary containment if an oil spill occurred. The IDEM noted that Duke Energy had not installed additional containment such as berms or concrete walls that would prevent an oil spill from reaching a nearby stream. The IDEM informed the utility that it would need to retrofit this substation with additional containment to comply with SPCC regulations.

> ***"EPRI oil spill evaluation software provided us with the data to back up our assumptions with the regulators and reinforced our internal process for assessing substation containment."***
>
> ***~ Tammy Jett, Duke Energy***

Challenge

Indiana Department of Environmental Management informed Duke Energy that the containment at one of its substations was not adequate to prevent transformer oil, a highly-refined *mineral oil*, from reaching a nearby waterway if a spill occurred.

Solution

Duke Energy used EPRI's Mineral Oil Spill Evaluation System tool to develop numerous oil spill scenarios demonstrating that oil from the substation would be adequately contained.

Results and Benefits

Duke Energy saved at least $20,000 by avoiding containment retrofits at the substation.

Duke Energy gained credibility with the EPA by using the EPRI Mineral Oil Spill Evaluation System to supplement its existing SPCC plan.

This application set a precedent for SPCC assessments at Duke Energy's other Indiana substations.

Duke Energy was confident that its internal assessment of this substation's containment was accurate, but it needed additional data to convince IDEM. The utility turned to EPRI and its Mineral Oil Spill Evaluation System tool to provide them with the information it needed. The Mineral Oil Spill Evaluation System is a software program that allows users to enter their individual site data and then run simulations to evaluate the risk of oil from that substation reaching nearby waterways. Duke Energy did field assessments at the substation to gather data such as the size of the substation, the distance to the stream, the type of soil and the thickness of the surrounding rock. Once the data had been compiled, the utility assembled its internal engineering team and performed a number of oil spill simulations in the software. According to Tammy Jett, an Environmental Specialist at Duke Energy, "EPRI's tool had all the inputs that made it logical. We did multiple runs of the software using very conservative inputs. The results showed that our initial evaluations were correct and that there was virtually no possibility of oil reaching water from this substation during a spill scenario."

Duke Energy Receives Regulatory Approval, Avoids Retrofits Costs and Sets a Precedent for Other Substation Evaluations

Once Duke Energy had completed the software simulations, it created a report of the results and attached it as an appendix to its recently-completed SPCC plan, had it reviewed and endorsed by its engineers, and sent the package to the regulator. Tammy Jett notes that, "we were very pleased with the process. It was great to have the regulating agency agree with us and I think it gave our internal engineers great peace of mind to know that our original assessment was correct." As a result, Duke Energy was not required to install additional containment at the substation, which saved at least $20,000 in retrofit costs. Because EPRI's oil spill evaluation software is used widely throughout the industry and is also well-known to the U.S. Environmental Protection Agency, Duke Energy also gained credibility with the state regulator by using it to prove that its internal evaluation was accurate. Finally, when the utility needs to update SPCC plans for the other substations in Indiana, it will be able to use the software to evaluate and verify its own internal evaluations, which could help avoid substantial retrofit costs in the future. EPRI project manager Mary McLearn notes that, "This kind of approach can be used at other substations, so the potential savings are enormous."

Tammy Jett is the recent recipient of an EPRI Technology Transfer Award for this successful application of the Mineral Oil Spill Evaluation software. Having been a member of EPRI's T&D Facilities and Equipment Environmental Issues program for several years, Duke Energy has been able to provide input to the software, as well as numerous other EPRI projects and products. According to Jett, "We get to help shape the research and we're always collaborating. EPRI's program managers are able to hear our ideas and problems and translate it into something we can use. EPRI has an uncanny way of being right on target."

Related Publications

Title	Product ID
PNM Resources Avoids Substation Retrofit Costs Through Oil Spill Risk Evaluation, 2010	1020814
Mineral Oil Spill Evaluation System Leak Tool 1.0, 2007	1014055
Oil Fires in Electrical Equipment, 2006	1012601
MOSES-MP Helps Central Hudson Gas & Electric Assure Environmental Protection at Substations at Reduced Cost, 2003	1007393
Mineral Oil Spill Evaluation System – Multi Phase Code, Version 3.0	1006479

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com)

CONTACTS

Mary McLearn, *Senior Project Manager*
650.855.2487, mmclearn@epri.com

1022524 January 2011

Electric Power Research Institute
3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com