



What You Should Know:

Contractors tasked with core drilling two access holes in the concrete floor in a Southern Company Hydro facility control room used ground penetrating radar (GPR) (Figure 1) to inspect the floor where the holes were to be drilled to ensure no objects were embedded in the concrete. However, despite an absence of visible indications of obstructions on the scan in both cases, each core drill bit contacted an energized 110-V circuit embedded in the concrete floor. Fortunately, no one was injured by the electrical contact with the core drilling machine, but a Stop Work was enacted until the event could be better understood.



Figure 1. Typical Ground Penetrating Radar device

The plant workers and the contractors were familiar with using GPR to identify embedded materials in concrete slabs agreed this was the best method for inspection. While GPR and X-rays are outstanding mitigation tools, they do not offer a 100% guarantee of the absence of utilities.

GPR is a good tool for looking into concrete slabs, and is reliable in identifying structural components, post-tension cabling, and larger conduit at depths up to 28 in. The radar waves return signals to a transponder to provide the location of any object that has a greater or lesser reflectivity than the surrounding concrete. However, the composite nature of concrete coupled with the small diameter of the 110-V conduit reduced the tool's ability to differentiate the conduit from the surrounding material. As a rule, GPR can best detect objects with a diameter of 1-in. for every 1-ft. of embedment depth, which displays a resolution of approximately 5-cm or 2-in. wide, although the resolution of the GPR scan is primarily determined by the wavelength of the radar waves being used.

What You Can Do:

- GPR is a reliable tool for identifying structural materials or large conduit embedded in concrete and should continue to be used in most cases where existing concrete must be removed.
- X-ray inspection of concrete slabs can be used where there is the potential for contacting small diameter embedded objects. Radiography provides a higher-resolution image of the slab and is more reliable at detecting small-sized objects, however access to the area must be controlled and the opposite side of the surface being inspected must be available for placement of the target for the X-ray.

Contact your local safety representative for additional information on best practices for identifying embedded electrical conductors.