LOCATING UNDERGROUND STORAGE TANKS

Mapping underground fuel storage tanks at a local gas station

Sensors & Software

Overview

Ground penetrating radar (GPR) mapping surveys are commonly used to identify the presence of underground storage tanks (USTs). A locating service company was called in to perform a GPR survey to map the location of the underground storage tanks at the gas station. The EKKO_Project software was later used to view the grids as one large data set.

Challenges

Environmental monitoring and spill management is a priority at high risk sites where hazardous substances are stored. As part of an environmental risk management initiative, a local gas station was advised that they should install additional monitoring wells.

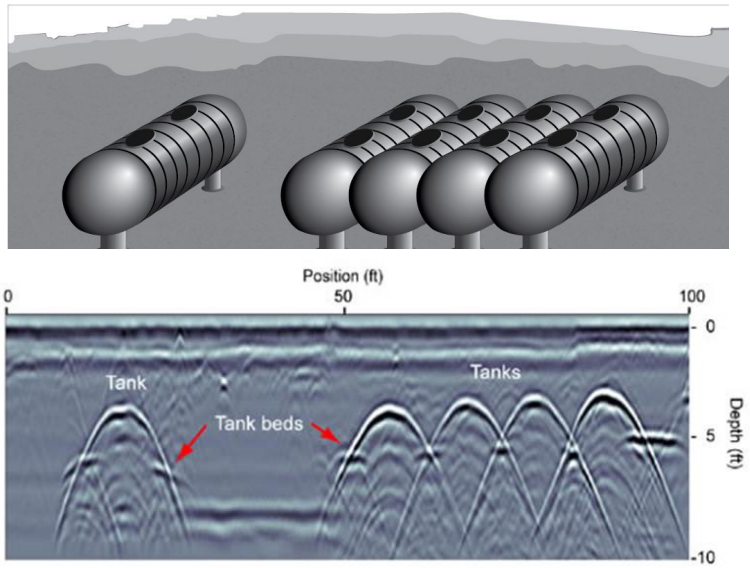
Since the gas station did not have records of the exact perimeter of the underground fuel storage tanks, it was necessary to map them and other buried infrastructure so the wells could be safely installed.

Solution

A Noggin 250 SmartCart was used to map the location of the USTs at the gas station. It was necessary to cordon off the work area for safety reasons but access to some of the gas pumps had to be maintained. To minimize disruption to the business, the area was broken into four grids and surveyed at separate times. EKKO_Project software was later used to view the grids as a single large grid. The GPR survey identified five storage tanks and the pipes connecting them. GPR survey results can be displayed in several ways, each providing different perspectives and understanding of the data.

Surveying the gas station with the Noggin 250 SmartCart.

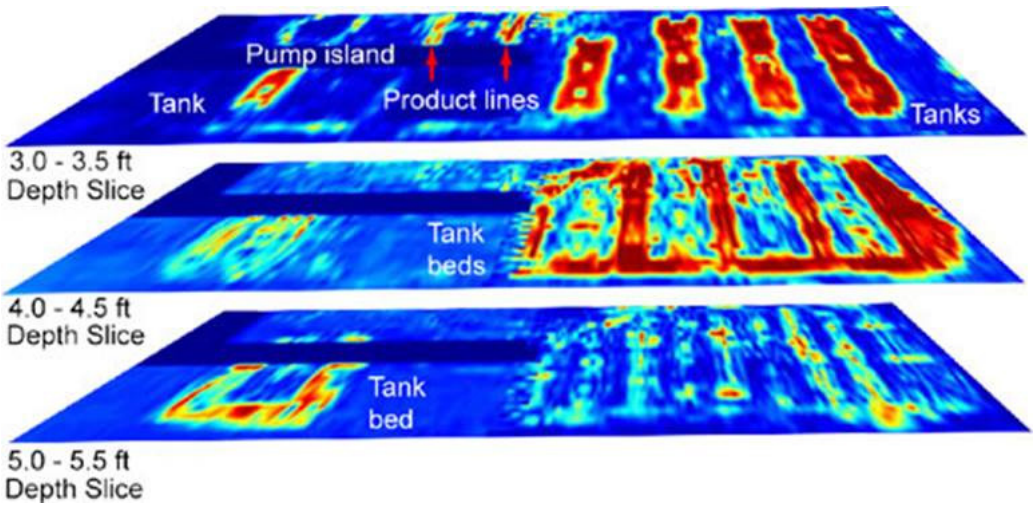
Cross-Section: The cross-section clearly shows five USTs; four grouped together on the right and one further apart on the left. The hyperbolic response suggests that the tanks are round in shape and it is even possible to see slight differences in burial depths. The tank on the far right is the shallowest at approximately 3 feet in depth.



Noggin 250 GPR cross-section showing underground storage tanks.

The leftmost tank is about 0.5 feet deeper. The flat line reflector observed between the tanks is interpreted to be the tank bed.

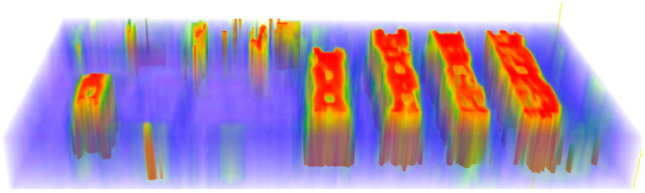
Depth Slices: The position and length of the tanks are evident in the depth slice images. Data had to be collected around a pump island resulting in a blank area within the grid data. This obstacle was easily avoided with the flexible grid collection features of the Noggin. Product lines, leaving the island and going to another tank (not shown here), are also visible in the depth slices.



Underground storage tanks and product lines visible on GPR depth slices.

GPR depth slice displayed in Google Earth™

Google Earth™: When the Noggin GPR is used with an external GPS, the positioning data is automatically integrated with the GPR data. Using the EKKO_Project software, depth slices can be exported as Google Earth™ compatible KMZ files. This is a very powerful tool for plotting geo-referenced depth slices of buried utilities. Users launch Google Earth™ and immediately "fly" to the surveyed location. They can then view and toggle between multiple depth slices.



3D visualization of the GPR data.

3D: GPR grid data were exported from EKKO_Project in a 3D format and plotted with the Voxler 3D visualization software. All the GPR data collected in the separate grids can be displayed in a single view, making interpretations easier. Users can rotate and cut into the data volume or make weaker GPR signals translucent or invisible to highlight signals from strong GPR reflectors.

Results

This GPR survey clearly located the buried storage tanks and provided the subsurface insights needed for boring to occur and the monitoring wells to be installed.

This is just one example of how GPR can locate underground structure to ensure safe construction for environmental projects.

This case study illustrates how many professionals are deploying GPR systems to address similar problems around the world.

Key results to note:

- GPR was a practical solution when no other method could locate these USTs.
- SmartCart configurations are optimized for rapid grid surveying.
- The field crew were easily trained in the whole methodology in less than a day.
- The whole project was completed by a two person crew in less than half a day.
- Integrated operation of EKKO_Project software and field data acquisition makes on-site mapping quick and easy.
- GPR image mapping results can also help locate take-offs and product lines.

Ground penetrating radar is a proven tool for subsurface utility mapping and environmental assessments; especially in locating and mapping active and abandoned USTs.

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