STREAM EM survey in a tank farm
Dukhan - Qatar

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STREAM EM survey in a tank farm

The STREAM EM survey was performed in a tank farm used to store fresh water for the city of Dukhan - Qatar.

Growth of the city leads to an increase in fresh water needs. Therefore the local authority planned an expansion of the existing tank farm, with the construction of new tanks to increase the water storage capability.

A map of the existing buried utilities in the entire farm was required before starting construction of the new structures.

The mapping project was performed by IMG Srl (Italy) in cooperation with the Qatari company Al Mustafawi.
STREAM EM survey in a tank farm: project details

The GPR survey was included in the project for Qatar Petroleum for the construction of additional water storage at Jabel Tank Farm, Dukhan.

Below are the details of the complete project, in which utility mapping by GPR is included:

- Client: Qatar Petroleum
- Year: 2014 – 16
- Type: Construction Project
- Project Details:
  - Demolition of 2 existing tanks
  - Construction of 2 new tanks
  - Construction of platforms and handrails
  - Construction of piping works and pipe supports
  - Carrying out foundation work for a portable water tank
  - Carrying out construction of a retaining wall
  - Relocation of fire water pump and related works
  - Electrical and instrumentation works
  - Pre-commissioning and commissioning works
STREAM EM survey in a tank farm

Investigated zone: Tank farm in the Dukhan urban area.
STREAM EM survey in a tank farm: Survey set up

Transport of the system to the final destination in Dukhan

STREAM EM set up and RTK-GPS installation

Survey by STREAM EM
Survey in a tank farm: Survey set up
STREAM Modularity

Hi-Mod with 4 dual frequency antennas for surveys in zones where it is not possible to use a system towed by a vehicle.

STREAM X configuration used for off road survey.
STREAM EM survey in a tank farm: site info

Soil section in the area showing clay-stone levels and silt levels with a high salt content (critical condition for GPR survey).

Excavations showing the existing utilities
STREAM EM survey in a tank farm

The zone of interest for the GPR survey covered a total area of around 40,000m² and was partially covered by existing structures.

The survey was performed by:

- STREAM EM on the flat areas;
- STREAM X on rough surfaces;
- RIS MF Hi-Mod#4 in the area where it was not possible to drive a vehicle.

Survey time for total GPR coverage: 1 day

Time to process and present results: 2 days
STREAM EM survey in a tank farm: data acquisition 1/3

GPR data collection by IDS OneVision software allowed real-time 3D radar tomography (time slices), real-time target viewing and full GPS navigation on Google Maps.
STREAM EM survey in a tank farm: data acquisition 2/3

GPR data collection by IDS OneVision software allowed real-time 3D radar tomography (time slices), real-time target viewing, on-site pipe picking and full GPS navigation.
STREAM EM survey in a tank farm: data acquisition 3/3

GPR data collection by IDS OneVision software allowed real-time 3D radar tomography (time slices), radar sections, real-time target viewing, on-site pipe picking and full GPS navigation.
STREAM EM survey in a tank farm: data processing 1/3

3D radar tomography (time slices) with pipes (red circles).
STREAM EM survey in a tank farm: data processing 2/3

3D radar tomography (time slices) with manhole covers (orange spots).
STREAM EM survey in a tank farm: data processing 3/3

3D radar tomography (time slices) with buried circular structures (red circles) - old tanks?
STREAM EM survey in a tank farm: results 1/4

The final results with detected pipes and cables exported directly into AutoCAD software.

AutoCAD map of the complete area covered by the GPR survey
STREAM EM survey in a tank farm: results 2/4

The final results with detected pipes and cables exported directly into AutoCAD software.

AutoCAD map: zoom with main pipes (pink) and some smaller connections (blue).
STREAM EM survey in a tank farm: results 3/4

The final results with detected pipes and cables exported directly into AutoCAD software.

AutoCAD map: zoom with main pipes (pink) and some smaller connections (blue).
STREAM EM survey in a tank farm: results 4/4

The final results with detected pipes and cables exported directly into AutoCAD software.

AutoCAD map: zoom with main pipes (pink) and some smaller connections (blue).
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Conclusions:

• A dense array of antennas towed by a vehicle provides a unique solution suitable for fast mapping of large areas.

• STREAM EM’s features (dense data spacing, dual frequency antennas 200-600 MHz, dual polarization antennas) allow accurate mapping of buried utilities.

• Despite the critical soil conditions for GPR surveys (high levels of clay and salt), the use of a dense array enabled a map of the buried utilities to be created, something which would not be possible with a single antenna GPR.
For more information please contact:

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