

# **Ground Penetrating Radar Survey Report:**

## **En Fashkha Project En Fashkha near Dead Sea, Israel**



**Data Acquired October 25, 2008**

**Report compiled November 1, 2008**

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**Ground Penetrating Radar (GPR) Study:  
En Fashkha Project  
En Fashkha near Dead Sea, Israel  
*1 November 2008 Report of 25 October 2008 Study***

## **Background**

During September 2009 Mnemotrix Israel was contacted regarding a GPR survey at a site related to the famous Copper Scroll found with the other Qumran scrolls. This scroll is made of copper and inscribed upon it is a list of treasures said to have originated in the Temple of Jerusalem in ancient times. Morningstar Entertainment, a company that produces educational television programs, contacted Mnemotrix Systems in the hopes of conducting a Ground Penetrating Radar (GPR) survey at one of the sites related to the Copper Scroll search in conjunction with the filming related to an episode centered on the scroll itself. Thus after many weeks of planning, a GPR survey was decided upon at En Fashkha, located very close to the northwestern corner of the Dead Sea.

En Fashkha is a site dated to the Roman period (1<sup>st</sup> century BCE to 1<sup>st</sup> century CE). Two archaeologists have excavated the site in 1958 and 2001; archaeologist Father Roland de Vaux and archaeologist Yizhar Hirschfeld, respectively. The site consists of a farm, a two-story dwelling thought to be a rural villa, an enclosed courtyard that functioned most likely as a stable and pen, and an industrial facility. This industrial facility is thought to have been used for balsam perfume manufacture or date wine or date honey production. Dr. Alison Schofeld of the University of Denver was interviewed for this segment of the episode and it is her opinion that the site functioned as a producer of date wine.

On October 25, 2008 Mnemotrix Systems, Israel conducted a GPR survey in the Industrial complex. Data acquisition was successful and we were able to see into the ground significantly well to give the producers of the show a "wow" moment that showed how GPR is successful at archaeological sites to make all involved in the discovery process more efficient.

## **Description of Survey Area and GPR Actions Taken**

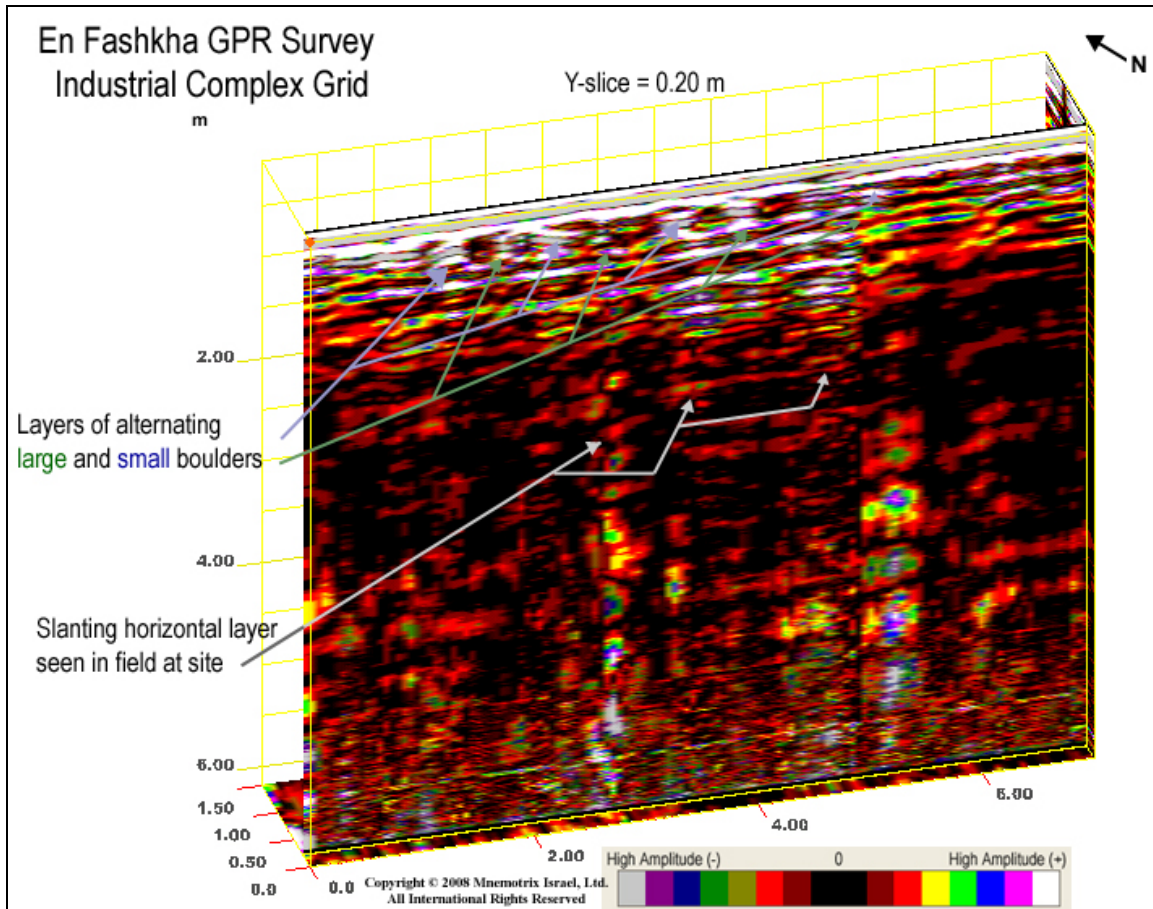
The survey area (see Figure 1) is located on a raised platform area between two channels. The platform is about 1-1.5 meters above the excavated surface. Data was collected with a 400 MHz GSSI antenna with a 100 nanosecond window, giving us a viewing window of about 2-5 meters. We chose a dielectric constant of 5.5 as we would be sending the GPR signal through large limestone rocks and boulders and soil. After recording specific measurements of the area GPR data acquisition began. Data was acquired every 20-30 cm in a general west to east direction. The grid itself is 7 meters east-west by 1.5 meters north-south.



Figure 1: The GPR survey grid in the Industrial Complex of En Fashkha.

## Post-Processing and Analysis

Standard post-processing was completed on the 3D grid once data was taken out of the field for analysis. What was seen in the field as a slanted sub-surface possible occupation layer or geological layer due to deposition of the Dead Sea coast was further understood to be more horizontally oriented. While in the field it was clear that the platform walkway was built of alternating layers of large and smaller boulders. These layers were seen nicely in the GPR data while in the field and during post-processing (see Figure 2). A final animation was created for viewing the entire platform from a side profile, which can be seen here at this URL on the Mnemotrix servers: [http://www.mnemotrix.com/gpr\\_data/israel/dead\\_sea/FshAnim.gif](http://www.mnemotrix.com/gpr_data/israel/dead_sea/FshAnim.gif). Here we are able to see how the layers change slightly as we move generally south to north from one edge of the platform to the other.



**Figure 2: View of the Slanting horizontal layer mentioned in the field in addition to layers of large and small boulders that build up the platform between two channels at the site.**

## Conclusions

Data acquisition at the site was successful and penetration of the GPR signal into the ground gave us valuable information up to about 3-4 meters sub-surface of the excavated layer at the site (about 1.5-2 meter depth in Figure 2 above). While this gridded area is only a fraction of the whole site, this data has enabled us to see valuably into the ground without digging. What is also interesting at the site is that there were only a few occupation levels. From our small grid it appears that this is certainly true in terms of sub-surface features. No major anomalies of distinction were seen in the GPR survey thus further proving the archaeological data to be true. In this way ground penetrating radar functions to make archaeologists and archaeology more efficient in its use and application, allowing worthwhile amounts of effort to be placed in the most beneficial locations.