

Building Analytical Capabilities in the United Arab Emirates

The challenge...

The United Arab Emirates is continuing its efforts to enhance the use of nuclear techniques for non-power applications, such as in environmental monitoring in view of industrial and construction projects. Nuclear techniques can also be used for materials analysis to support a range of local needs: forensic, industrial, archaeological, and for the preservation of cultural heritage. With the support of the IAEA technical cooperation (TC) programme and in collaboration with the University of Sharjah and the American University of Sharjah, the United Arab Emirates embarked on establishing its first national X-ray fluorescence laboratory, which will offer analytical services using non-destructive testing.

The project...

Between 2009 and 2015, support was provided through two TC projects to establish the national X-ray fluorescence laboratory and to enhance its analytical capability for environmental and archaeological applications. The laboratory aimed to provide services in the characterization and analysis of materials to meet the needs of national organizations working on archaeological and heritage artifacts, environmental contaminants (e.g. heavy metals) in air, water or soil, forensic evidence and new industrial materials.



Investigations into the archaeological findings of The Al-Dor Temple in Umm Al- Quwains.

Expertise and training were provided in analysis, characterization and testing, and a business plan for the sustainability of the laboratory was developed. The laboratory was also equipped and upgraded with capital equipment and accessories. The project was crucial for the transfer of knowledge and expertise in the use of nuclear techniques, which was delivered through expertise, fellowships, and workshops across the United Arab Emirates.

The impact...

The laboratory, the X-Ray Center for Material Analysis, is now a leading national and regional facility, and a hub for education and training. It is able to provide services in material characterization and analysis to the public and private sector, and end users no longer have to resort to companies abroad. Projects have already been undertaken in environmental/pollution monitoring, agriculture and mineral prospecting, human health, forensics, and the protection of cultural heritage.

The laboratory supported the restoration efforts of the first century temple 'Al-Dor' at Um Al-Quwain, United Arab Emirates. Analytical techniques, such as Raman and X-ray diffraction, confirmed that the plaster from the temple walls was calcite rather than gypsum-based, thus assisting conservationists in the preparation of restoration materials. Other measurement tools such as X-ray fluorescence helped identify the source material for the original mortar used in the building, by matching mortar composition to one of five suspected sites. This answered a question which had puzzled archaeologists for many years.

To ensure its sustainability, the laboratory collaborates with a number of museums, environmental and industrial agencies, and governmental partners, and is now fully operational.

Technical cooperation projects UAE/0/006: Establishing an X ray Fluorescence Laboratory for Environmental and Archaeological Applications and UAE/1/001: Enhancing Analytical Capabilities for Environmental and Archaeological Applications - Phase II