

Air Sampling at Barakah NPP – Challenges with environmental conditions on system performance and enhancements made to instruments and monitoring protocols.

Andrew Maddison,^{1,*} Amna Al Maazmi,¹ et al¹

¹ ENEC Operations, Abu Dhabi, United Arab Emirates

* e-mail: andrew.maddison@enec.ae

The Barakah Nuclear Power Plant (BNPP) in the United Arab Emirates was envisioned in 2008 with the Emirates Nuclear Energy Corporation (ENEC) beginning construction of the first unit in 2010. The location of this project is in the Western Region of Abu Dhabi in the Arabian Peninsula and is located on the Arabian Gulf. As part of the operational requirements, ENEC has a Radiological Environmental Monitoring Program (REMP) which is implemented by the Environmental Radiochemistry Laboratory (ERL). This program is responsible for monitoring the environment around the BNPP site to ensure that no unmonitored radiological release pathways exist through the sampling of air, water, sediment, and biota on a regular basis. Air sampling is a key component of this program and is monitored 24/7.

The pre-operational monitoring phase for air sampling, to establish baseline variations in the environment around BNPP, began in August of 2014. The operational phase of the REMP began in March 2020 when the first fuel was loaded into Unit 1. During this time, the ERL has encountered challenges due to the harsh environmental conditions present around the BNPP site. These conditions include high temperature (>45 °C), high humidity (> 90% RH), high dust content, and corrosive conditions due to salinity of the Arabian gulf and shallow ground water surface soils which are categorized as Aquisalids. These conditions have impacted the operational performance of the physical samplers through corrosion of electronic components, premature failure due to thermal stress of materials and components, and unpredictable plugging of particulate filters due to dust loading and water saturation from the high humidity.

The ERL has worked with F&J Specialty Products Inc to develop an air sampler system better capable of working in conditions encountered around BNPP in addition to providing telemetry information to aid in maintaining operational knowledge on the status of the system to plan for filter loading issues. This presentation will discuss the issues which were encountered, the design and testing of the modified system, and the current performance status of the new air sampler systems