

## Background of assessing geological materials for a potential low and intermediate level radioactive waste repository in Bangladesh

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Low and Intermediate level wastes (LILW) in Bangladesh are being generated from operation, repair and maintenance of 3MW TRIGA MARK-II research reactor (RR), 14 MeV Neutron Generator and research & commercial irradiators such as Co-60 and isotope production for medical purposes. The wastes arising from these sources are generally spent ion exchange resins, graphite, lead and polythene plugs, contaminated vials, hand gloves, plastic syringes, tissue papers, shoe-covers, protective cloths, plastic and metallic wares, spent and disused sources (SRS), activated carbon, gaseous discharges, etc. The radionuclides involved with these wastes are- Co-60, Cs- 134 & 137, Sr-90, Ir-192, Tc-99m, I-131, I-125, C-14, H-3, Ra-226, Am-Be neutron sources, Cm-244, Am-241, Cr-51, Mn-54, Zn-65, P-32, Sc-46, etc. Solid radioactive wastes are collected, segregated at the place of generation and stored in interim-storage rooms of the Central Radioactive Waste Processing and Storage Facility (CWPSF), developed by Bangladesh Atomic Energy Commission (BAEC) in cooperation with International Atomic Energy Agency (IAEA). Short lived radionuclides containing solid wastes are managed by delay-and-decay storage and released into the environment. Others are safely transported & stored in shielded enclosures within CWPSF. Besides, Bangladesh is implementing Nuclear Power Plant (NPP) projects by constructing two reactors of 1000 MW each. It is expected to have more LILW from this NPP which needs to be disposed safely. For safe disposal of LILW, a National Radioactive Waste Management Plan (NRWMP) has been formulated by BAEC where site investigations and processes for site selection for waste disposal facilities is one of the key issues.

For selecting a potential site for safe disposal of radioactive waste, Bangladesh have several apparently suitable geological formations, such as basement hard rock at more than 100 m depth and clay formations exposed at many locations to few meters only. The basement hard rocks of Bangladesh are tonalitic and granodioritic rocks, variously deformed to granitic gneiss and intruded by younger monzogranite having mineralogical composition of plagioclase, quartz and hornblende, with lesser amounts of biotite and potash feldspar and trace amounts of clinopyroxene, titanite and iron oxides. (Ameen et al., 2007). On the other hand, the tropical clays of the central part of the country, called Madhupur Clay Formations are typically highly weathered and reddish brown color. They are mainly composed of kaolinite, illite, chlorite and illite-smectite mixed layer minerals along with some non-clay minerals like quartz, cristobalite, orthoclase, microcline, plagioclase, calcite, siderite and dolomite and of intermediate to high plasticity inorganic clay (Haque et al., 2013; Hossain and Toll, 2006). Physical and engineering properties of these two types of geological materials have been studied by various researchers to some extent. However, their detail geochemical characteristics, specially the migration behavior for radionuclides and associated studies have yet to be investigated. The present study will review these two materials' properties for potentiality of hosting LILW repository with suggestions for future investigations.

Keywords: Basement hard rock, Madhupur Clay, Radioactive waste repository, Bangladesh