

Title - Geochemistry at the Afghanistan Geological Survey

Authors - Mr Richard A Shaw and Dr Michael J Watts – British Geological Survey

Due to recent troubles in Afghanistan, the Afghanistan Geological Survey (AGS) suffered considerable damage to the building and its laboratories, records and collections. Between 2004 and 2008 The British Geological Survey was commissioned by the UK government (DfID) to undertake institutional strengthening of the AGS, through capacity building and transfer of skills. One aspect of the project was the rebuilding of the laboratory facilities (see June 2007 issue) including a geochemical laboratory. It had been over two decades since the AGS had undertaken geochemical analyses in the chemistry laboratories. Those analyses were carried out as part of a Soviet run mineral exploration programme, with skilled chemists organising the work of technicians. Introduction of modern work practices was crucial, owing to technological advances and changes in work practices over the intervening years.

Equipment and services found in modern laboratories are often taken for granted but in Afghanistan obtaining even the most basic items and facilities often proved to be a challenge. The laboratory was a blank canvas with nothing but work benches. Equipment for a filtered water supply, fume cupboard and chemistry materials were shipped from the UK to Kabul and assembled in June 2007. Problems with intermittent power supply, dusty conditions and lack of local expertise added to the challenges in setting up a geochemical laboratory, and required a pragmatic approach. Basic equipment was used to assess the knowledge and practical skills of AGS chemists. The laboratory was supplied with a Palintest 7500 spectrophotometer for conducting chemical assays, selected for the rugged design and simple mode of operation. This together with a pH meter, laboratory glassware and chemicals completed the set-up for assaying water samples, with additional equipment for sample dissolution of solid materials.

For an initial assessment a series of basic chemical assays were carried out, including pH and the spectrophotometric determination of, copper nickel, and zinc in water samples. The 15 members of the chemistry team were split into two groups, partly to enable the trainees to attend English and IT courses provided by BGS, and partly to make the training more manageable, whilst introducing some competition between the groups. The training included the basics of health and safety, maintenance of equipment to ensure continued operation without BGS presence, record keeping, quality assurance and avoidance of sample contamination, and chemistry basics such as units of concentration, pH and absorbance theory were taught. Practical skills taught and assessed included use of an analytical balance, use of basic glassware, collection and preservation of water samples, followed by the operation of the Palintest spectrophotometer and manipulation of data using Microsoft Excel.

The delivery of a combination of practical sessions and theory based lectures was followed by an assessment of homework questions and weekly exams, with a weekly scoring of all trainees to measure progress. The three highest scoring trainees took responsibility for the laboratory in the absence of BGS staff. The trainees were keen to learn new skills, many of them displaying a real interest in the practical aspects of

laboratory work. There were some challenges; in particular because some of the more technical terminology was lost in translation. The transformation has been remarkable, from a ruined laboratory, with AGS staff having no hope or focus, into a useful, modern, albeit basic laboratory capability, with motivated staff intent on learning new skills and modernising old ones.

The installation of this laboratory and assessment of staff skills enabled BGS to provide detailed advice in advance of plans from the Afghan Ministry of Mines to invest in modern geochemical facilities at the AGS. Since the completion of the BGS project in January 2008, the AGS has begun to take delivery of equipment, including an X-ray fluorescence spectrometer. Providing this investment is followed up with long term training and resourcing, it is anticipated that the geochemistry laboratory will contribute to mineral exploration projects and a potentially prosperous and stable future for both the AGS and Afghanistan.