ment as well as sleeping and cooking facilities for the chemist. They can be stocked with chemical supplies and equipment with which rocks and/or soils can be analyzed for as many as 41 elements. Instead of shipping his samples to a central lab and waiting weeks or even months for results, the geologist can get his samples analyzed in a mobile lab within hours after he has collected them, thereby enabling him to carry out his work more effectively—abandoning areas in which the analyses are low and concentrating his efforts in areas of promise.

Neutron activation methods have been used for several years to analyze rocks and soils in the laboratory. Recently, F. E. Senftle of the Geological Survey developed a truck mounted instrument, which makes it possible to use neutron activation for analyzing rocks and soils in place. Consequently, it is no longer necessary even to collect a sample, as long as a truck can be driven over the spot that one wants analyzed. The rock or soil under the truck is irradiated and the activities of the induced products are determined. The nature and concentration of the induced radioactivity indicate the amounts of certain elements present in the area being tested. An instrument for performing in situ analyses for silver is now operational and one capable of detecting gold is being developed.

New sampling equipment and methods are essential to the success of the Heavy Metals program since accurate sampling is the vital link between finding targets and developing an actual resource. In recent years one of the most interesting and novel developments in drilling has been that of vibratory-resonant drilling. This concept, which consists of vibrating the drill rod rather than pounding it, has increased the speed of drilling considerably in soft and unconsolidated materials. This type of drilling was developed by a totally owned subsidiary of the Shell Oil Company and is being used commercially in driving piles. Experimental units have been developed for drilling smaller diameter holes. The Bureau of Mines has cooperative agreements to test this concept of drilling and recovering cores during an Alaskan cruise this summer by its marine mining research vessel the R/V VIRGINIA CITY (fig. 33). Another unit has also been purchased to test in-land deposits.