Manager, Hydrogeology. Responsible for management and quality assurance of hydrogeologic projects and investigations; direct and coordinate the professional activities of 4 hydrogeologists and 2 geologists in the investigation of groundwater quality studies, assessment of groundwater contamination incidents, design and installation of monitoring wells, and delineation of plume boundaries and aquifer tests. Employ environmental and hydrogeological principles, hazardous waste remediation technologies, hydrogeological modeling, risk evaluation and field interpretation to devise clean-up techniques for complex environmental problems, including surface/groundwater interaction in flood prone areas. Utilize state-of-the-art computer modelling programs, plotting programs and statistical programs including Flowpath, Slugix, Papadop, Quicksurf, Surfer, Graphmaster, Systat and Geobase software to predict and monitor groundwater and plume migration rates and effectiveness of capture zones through time. Extract data from which appropriate remedies to environmental problems can be defined. Interpret field data to prepare remediation design options, pursuant to current environmental regulations, including but not limited to RCRA, CERCLA, TSCA, Clean Water Act and Safe Drinking Water Act in developing and defining the available remedial alternatives. Conduct practical field sampling, drilling and well monitoring. Develop and execute internal technical seminar sessions; present information to clients in oral and written formats. Write EPA grant proposals. Ph.D. in Geotechnical Engineering or Geology and 3 years experience as Manager, Hydrogeology or 3 years experience as Geologist and/or Research Associate required. Previous employment or academic research experience must have included environmental assessment and remediation of volatile/semivolatile organics, impacted groundwater, and subsurface soils: the performance of slug and pump tests and soil-gas investigations; preparation of grant proposals; geological mapping and remote sensing; plotting programs and statistical programs to predict and monitor groundwater and plume migration rates and effectiveness of capture zones through time, using Flowpath, Slugix, Papadop, Quicksurf, Surfer, Graphmaster, Systat and Geobase software. 40 hours M/F, 9 a.m. to 5 p.m., \$48,500 per year. Must have proof of legal authority to work permanently in the United States. Send resumes to ILLINOIS DEPARTMENT OF **EMPLOYMENT SECURITY, 401 South State** Street - 3 South, Chicago, Illinois 60605, Attention: Jean Woodson, Reference #V-IL-10136-W. NO CALLS. AN EMPLOYER PAID AD – SEND 2 COPIES OF RESUME.

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- BOTT, M. H. P. 1973. The evolution of the Atlantic north of the Faroe Islands. In *Implications of Continental Drift to the Earth Sciences*, vol. 1 (eds D. H. Tarling and S. N. Runcorn), pp. 175–89. London, New York: Academic Press.

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