Geophysical Surveys as an Aid to Avoiding Geohazards in Pipeline Construction

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Many geohazards that are responsible for pipeline failures both during and after construction can be confidently identified with geophysical surveys, with some of these hazards being identified with near certainty. Such geophysical surveys are highly cost effective as they: 1. Assist in avoiding cleanup and other related costs resulting from horizontal drilling and construction problems, or later pipeline failures; and, 2. Allow construction contractors to bid at significantly lower total costs with the benefit of understanding, in advance, the geology and possible geohazards along the pipeline right-of-way. Typical features and geohazards for horizontal drilling and construction that geophysical techniques are well suited to identifying include thick muskeg, discontinuous permafrost, unexpectedly deep bedrock, fractured or weathered bedrock, high permeability granular overburden, paleoseismic activity, glaciomarine clays (“quick” clays), submarine landslides, and unexpected changes in bedrock geology. In this talk, specific geohazards will be discussed, and case studies will be presented.

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Paul Bauman is a Professional Geophysicist and Engineer with over 25 years of geophysical experience in the environmental, engineering, water resource, mining, oil and gas, and archaeology sectors. Paul has a B.Sc.E. in Geological Engineering from Princeton University, a minor in Near Eastern Studies also from Princeton, and an M.Sc. from the University of Waterloo in hydrogeology. He worked for Schlumberger International from 1981 to 1986 in remote locations in Borneo and Papua New Guinea. In 1990, Paul created and has since managed the near surface geophysics group at WorleyParsons (legacy Komex). This group numbers about 30 geophysicists and has worked on every continent in the world. Regarding applications to pipelines, Paul and the WorleyParsons geophysics group have carried out surveys at more than 300 proposed locations for horizontal directional drilling, as well as thousands of kilometres of geophysical surveying for mapping of muskeg thickness, discontinuous permafrost, paleofaulting, glaciomarine clays, and other geohazards. Paul has published more than 50 technical articles including in peer reviewed journals, scientific volumes, and conference proceedings. He has been an invited speaker at many educational, professional, and government institutions. Aspects of his archaeogeophysical work have been the subject of a NOVA documentary (Ancient Refuge in the Holy Land), CBC interviews, the National Geographic documentary Finding Atlantis, and numerous newspaper and magazine articles including in Time, National Geographic, and Reader’s Digest. Paul’s work in the Cave of Letters is featured in the popular books Secrets of the Cave of Letters: Rediscovering a Dead Sea Mystery, and Digging Through the Bible: Modern Archaeology and the Ancient Bible.