Hydrogeologic studies at a subsurface radioactive waste management site in west-central Canada

11:30 D. W. Goss, O. R. Jones: Movement and accumulation of suspended sediment during basin recharge

FRIDAY AFTERNOON, SEPTEMBER 28

Regionally Related Case Histories

1:30 I. W. Marine: Geohydrology of buried Triassic basin at Savannah River Plant

2:00 H. S. Puri, G. L. Faulkner, G. O. Winston: Hydrogeology of liquid-waste storage in Florida

2:30 J. I. García-Bengochea, C. R. Sproul, R. O. Vernon, H. J. Woodard: Artificial recharge of treated waste waters and rainfall runoff into deep saline aquifers of peninsula of Florida

3:00 M. I. Kaufman, D. A. Goolsby, G. L. Faulkner: Injection of acidic industrial waste into saline carbonate aquifer—geochemical aspects

3:30 W. E. Wilson, J. S. Rosenshein, J. D. Hunn: Hydrologic evaluation of industrial-waste injection at Mulberry, Florida

4:00 H. M. Peek, R. C. Heath: Feasibility study of liquid-waste injection into aquifers containing salt water, Wilmington, North Carolina

4:30 J. A. Leenheer, R. L. Malcolm: Case history of subsurface waste injection of an industrial organic waste

5:00 A. DiTommaso, G. H. Elkan: Role of bacteria in decomposition of injected liquid waste at Wilmington, North Carolina

SATURDAY MORNING, SEPTEMBER 29

Case Histories, Decision and Evaluation

9:00 E. G. Dennison, F. Simpson: Hydrogeologic and economic factors in decision making under uncertainty for normative subsurface disposal of fluid wastes, northern Williston basin, Saskatchewan, Canada

9:30 E. C. Donaldson, R. T. Johansen: History of two-well industrial waste disposal

10:00 B. F. Latta: Subsurface disposal of waste in Kansas

10:30 T. F. Lomenick, A. L. Boch: Site investigations for bedded-salt pilot plant in Permian basin

11:00 R. J. Schicht: Deep-well injection of desalting-plant waste brine

Abstracts

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Philosophy of Deep-Well Disposal

In recent years, deep-well disposal has been the subject of much discussion and criticism. Of the latter, some has been justified as a result of misapplication, but most has been unwarranted. Nevertheless, a fear factor has been aroused concerning deep-well disposal which is unjustified if the technique is properly applied and operated. Unfortunately, the public has confused the misapplication of the technique with the technique itself.

Deep-well disposal is not advanced as a cure-all for problems related to waste-liquid disposal. Its use is relatively limited considering the wide divergence in chemical composition of wastes. However, if installations are properly conceived, constructed, and operated, and are installed in a suitable geologic setting, they can fulfill a need without creating other problems such as can occur with waste-retention basins, incineration, or possibly even with sludge disposal. At the least, the deep-well method removes the waste from the biosphere.

Because the capacity of potential receiving formations is enormous, but finite, unrestricted deep-well disposal should not be allowed. The use of a formation for this purpose in any specific area should be controlled. Control in this context includes the awarding of permits and the delineation of factors such as acceptable injection rates and pressures, materials of construction, and such tests and monitoring facilities as can be justified to insure the utility and safety of the installation.

If expertise on these matters does not exist in the state, then it should be empowered to employ such experts on a consulting basis or to use the services of experienced government agencies, such as the U.S. Geological Survey or others. In any case, the equitable application of reasonable regulations can operate only to the benefit of all.

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Feasibility Study of Seismic-Reflection Monitoring System for Underground Waste-Material Injection Sites

Injection of waste materials into deep subsurface formations is becoming an increasingly popular method of waste disposal. Attendant to this growing practice is an increasing possibility of accidental damage to the subsurface and surface environments. An effective method of monitoring the movement and distribution of these injected waste materials is needed.

In most cases, the acoustical properties of the receiving formation material (*i.e.*, its density and velocity of propagation of compressional sound waves) will be changed upon contacting the injected waste materials. These changes subsequently will change the reflection coefficient encountered by a vertically traveling sound wave at the receiving formation. This change in acoustical properties suggests the application of modern seismic-reflection and data-processing techniques to this monitoring problem.

The seismic-reflection technique involves introduction of acoustical energy into the earth from the surface, and recording of signals at or near the surface. The signals are indicative of the travel time and amount of energy reflected from each of many closely spaced points along each subsurface formation. The use of the seismic method therefore is proposed on a periodic basis to detect changes of acoustical properties in the receiving formation and surrounding formations to monitor effectively the movement and position of the waste materials.

The assumed seismic field system for this monitoring system includes the following components: (1) permanent arrays of velocity geophones buried a short depth below the surface of the earth; (2) a multichannel digital recording system of the instantaneous-floating-point, binary-gain type; (3) truck-mounted seismic surface energy sources; and (4) use of a digital seismic data-processing center with special software.

The feasibility of the monitoring system has been studied by means of an acoustical model derived from well-log information for a typical Gulf Coast injection well. This model and the characteristics of the seismic field system determine the smallest detectable lateral