

Synopsis of GSA/AEG Jahns Lectures

2025-2026 RICHARD H. JAHNS DISTINGUISHED LECTURER

Dr. Chris Stohr (retired, Illinois State Geological Survey, Prairie Research Institute, University of Illinois at Urbana-Champaign), Mahomet Aquifer Council, Illinois Board of Licensing for Professional Geologists, former Champaign County [IL] Board Member, Urbana-Champaign Sanitary District Trustee

1. Retrospective of the Earthline Hazardous-Waste Landfill Failure, a Case Study of Legacy Landfills and Dumps

Subject of a landmark, legal-precedent setting trial, an unlined, hazardous-waste landfill was said by experts ‘not to leak in 100 years’ however, contaminants were detected in monitoring wells 3 meters from the burial trenches only 3 years after closure. Field and lab tests, and remote sensing measurements showed causes for the ‘faster than predicted’ contaminant migration from a hazardous waste landfill, but why? Numerous landfills are similarly constructed throughout the world.

2. Protecting Groundwater Quality Through Improved Landfill Field Inspections and Records for Maintenance and Conservation Using Freely-Available Imagery.

Legacy dump and sanitary landfills are cemeteries of wastes including some that are no longer permitted to be generated or buried. Unfortunately, infiltration from precipitation through deformed, thin earthen covers contributes to leachate generation that escapes through the unlined bottom and sides continuing surface and groundwater contamination. The Earthline Hazardous-Waste Landfill is a well-studied example of landfill operations, design, and contamination.

Regulatory landfill inspections mostly rely upon institutional memory and traditional ‘walk over’ inspections to identify flaws and deficiencies for written reports. However, most of these defects can be identified and mapped by GIS and image processing of freely available airborne lidar, historical black and white photography and modern color infrared orthoimagery to direct low-cost, spot repairs for maintenance and custodial care to reduce undesired contamination from legacy waste structures.

3. Navigating a Career in Environmental and Engineering Geology

Planning and preparing for a career is difficult. A geoscientist might have many careers in environmental, engineering, mining, and related disciplines requiring

both a breadth and depth of knowledge of geoscience including multiple technologies.

So much applied geology work affects public health and safety that professional licensing is required just as other professions such as engineers, physicians, and architects. A working professional should become licensed and keep abreast of developing technology and best practices in an increasingly sophisticated profession through continuing education. Professional organizations can help not only with technical skills, but also with informal practical help with ‘buried knowledge’, listening, leadership, organization, physical and mental wellness.

Participation in activities outside of professional work offers diversion and respite that offset the intense pressures of client-driven obligations with family and community concerns. Examples of international humanitarian development projects; volunteer, appointed and elected offices in working and post-work careers are illustrated.

4. Outcrop Measurements in Glacial Materials for Geo-Engineering and Hydrogeology Using Close Range Photogrammetry, Image processing, and Terrestrial LiDAR Scanning Which Became a Focus for Groundwater Protection

Mapping and measuring subsurface clast pavements and glacial channels phenomena were made using close range photogrammetry, terrestrial laser scanning and geodetic surveying methods along a remote stream in East Central Illinois. Deposits of coarse- and fine-grained sediments, informally assigned to the Glasford Formation lithostratigraphic unit, fill buried channels that provide an important source of groundwater in east-central Illinois for areas not underlain by the regional Mahomet aquifer. Measurements of buried channels are consistent with deltaic distributary systems formed in front of retreating ice margins.

This is an example of an ‘academic study’ with no apparent immediate use. However, health and safety concerns following the accidental escape of natural gas stored in a subsurface saline reservoir and the development of an ordinance for Carbon Capture and Storage [CCS] aka carbon dioxide sequestration in deep saline reservoirs raised the academic study to the nexus of science and public policy with lively public interest. An insight into geoscience in politics.

5. Detailed Image Interpretation of Thermal IR, Orthophotography, and LiDAR Imagery for GIS-based Tracking of Features of Interest on Legacy Landfill Covers

Infiltration of precipitation through earthen landfill covers contributes to leachate generation which can leak through the unlined bottom and sides of closed dumps and sanitary landfills. Several technologies (multi-date + multi-band aerial photography, airborne LiDAR, post-sunset thermal infrared imagery) were tested for identifying defects in landfill covers including depressions, erosion, landslides and areas of interest. Features of interest for field examination were identified by enhancing and comparing multiple dates of imagery using conventional photointerpretation cues and mapping/ tracking the features with GIS and a relational database. This is more technically focused discussion of #2

6. Short talks on

- a. Interpretation of Oblique Aerial Photography and Remote Sensing for Landslide Identification, Classification, and Inventory
- b. Detecting Carbon Dioxide Emissions in Soybeans by Aerial Thermal Infrared Imagery
- c. Downhole, Natural Gamma Logging for Engineering & Environmental Applications of Quaternary Geology Mapping
- d. Rio Gallegos Legacy Dump and Rising Sea Level in Southern Patagonia
- e. Some Engineering/Environmental Geology Problems of Beni Suef, Lower Egypt
- f. Quarry Wall Relaxation, Block Sliding, and Seismic Events Occurring in Chicago Metropolitan Area
- g. Describing earthen landfill cover soil cores
- h. What influence does a geoscientist-county elected official have on state and national politics? More than you think