

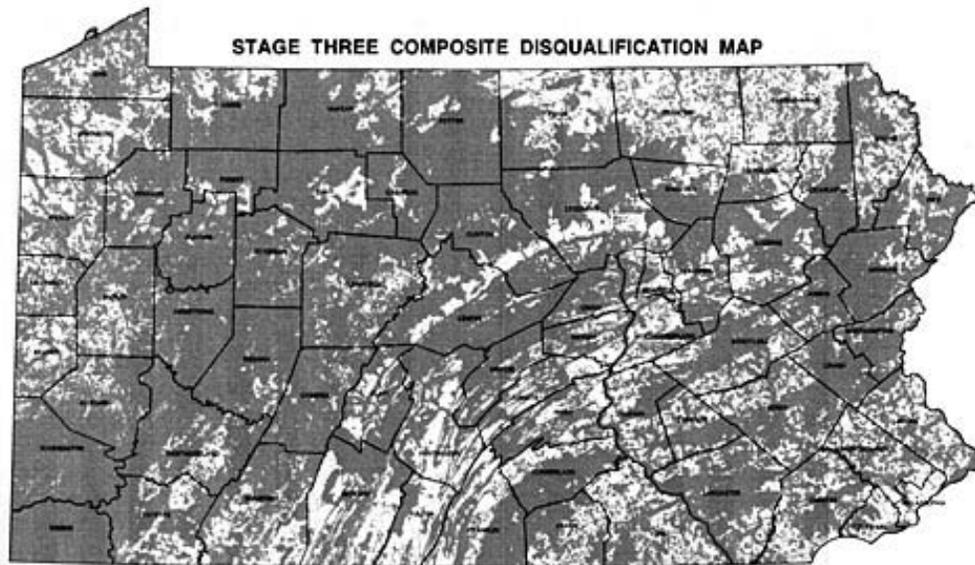


## Case study: Low-level Radioactive Waste Siting Map

The Pennsylvania Department of Environmental Protection (DEP) hires a contractor to identify potential sites for a 500-acre storage facility for low-level radioactive waste (LLRW). In collaboration with the DEP the contractor assembles a statewide GIS database that includes the geographic distributions of pertinent geological, hydrological and land use criteria. The contractor proposes to use overlay analysis to disqualify unsuitable areas. For example, areas characterized by any combination of permeable bedrock, excessive slope, or proximity to key water resources or protected lands (among other factors) will be deemed unsuitable.

The project involves three stages of screening for unsuitable areas: statewide, regional, and local. Each stage involves data fusion and analysis at larger map scales and greater detail. Public hearings are held at each stage to afford residents opportunities to ask questions about which areas have been disqualified, which are still in consideration, and why. The contractor produces reports for the hearings that explain the screening process and illustrate the geographic distributions of pertinent criteria and disqualified areas. By stage 3, three quarters of the state's land area are disqualified. The state agency hopes that communities in areas not yet disqualified will volunteer to host the facility in return for financial incentives. Most residents who attend the hearings, however, are determined to keep the proposed facilities as far as possible from their backyards.

A GIS analyst employed by the contractor is assigned by her supervisor to produce a statewide map showing areas disqualified after stage 3. A requirement is that the map be reproducible by black-and-white xerography (photocopy), and that it fit on a 11" x 17" page so that it can be folded into a page-size (8.5" x 11") report. The GIS analyst calculates that 1:1,500,000 is the maximum map scale at which the entire state can be shown on an 11" x 17" page. At this scale, some "islands" of potentially suitable areas surrounded by disqualified areas but large enough to contain a 500-acre facility will be too small to see. When the analyst explains this to her supervisor, he suggests that she include on the map a disclaimer stating that "it is possible that small areas of sufficient size for the LLRW disposal facility site may exist within regions that appear disqualified on the map. The detailed information for these small areas is retained within the GIS even though they are not visually illustrated." How should the analyst respond to this suggestion?



Areas (in gray) disqualified as potential sites for a low level radioactive waste storage facility. Disqualified areas depicted on a small scale map (original 1:1,500,000) mask small suitable areas large enough to contain the 500-acre facility (Chem-Nuclear Systems, Inc., 1994).

## References

- Chem-Nuclear Systems, Inc. (1994a). *Pennsylvania low-level radioactive waste disposal facility site screening interim report, stage three -- local disqualification*. Harrisburg PA.
- Chem-Nuclear Systems, Inc. (1994b). *Site selection manual*. S80-PL-007, Rev. 0
- Chem-Nuclear Systems Inc. (1996). *Community partnering plan: Pennsylvania low-level radioactive waste disposal facility*. S80-PL-021, Rev. 0.
- DiBiase, David (2008). *Nature of geographic information*, Chapter 9: Integrating geographic data. Retrieved 14 June 2008 from <http://natureofgeoinfo.org>
- Monmonier, Mark S. (1995). *Drawing the line: Tales of maps and carto-controversy*. New York: Henry Holt.
- Monmonier, Mark S. (1991). Ethics and map design: Six strategies for confronting the traditional one-map solution. *Cartographic Perspectives* 10, 3-8.

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## Resources for educators

Suggested discussion points, relevant GISCI Rules of Conduct, and further resources related to this case study are available on request. Send request to David DiBiase ([dibiase@psu.edu](mailto:dibiase@psu.edu)) along with contact information (including your position and affiliation) and a brief description of how you plan to use the case.

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