Martinsville: the Low-Level Radioactive Waste Disposal Facility that Never Was

"What is the matter?" said I, beginning to be alarmed. He could not speak. He was too overwhelmed for words. He simply pointed to the instrument.

—Henry Lawson in "Journey to the Center of the Earth" by Jules Verne.

Timeline

1980: Low-Level Radioactive Waste Policy Act promoted the siting and construction of new regional LLRW disposal facilities.

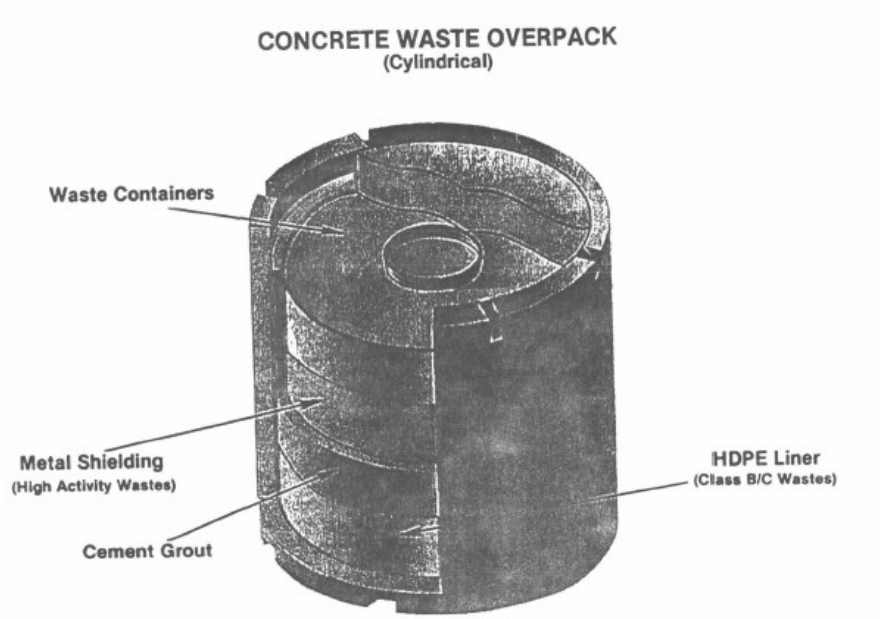
1984: Illinois and Kentucky formed the Central Midwest Interstate Low-Level Radioactive Waste Compact.

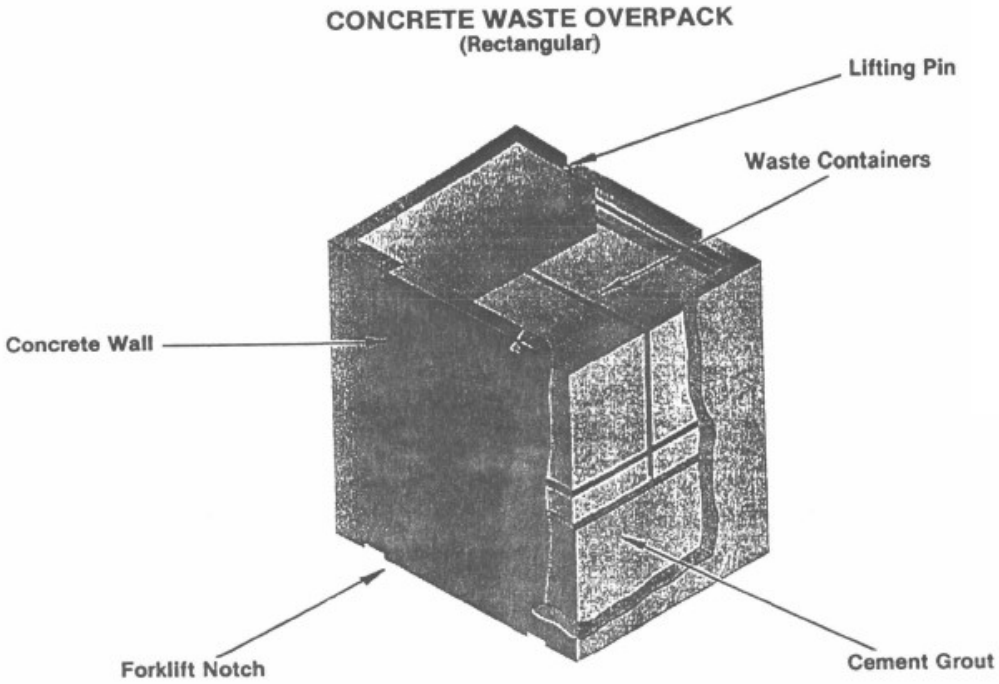
Beginning in about 1984, the Compact began the search for candidate sites. Illinois was designated to be the host State in 1988.

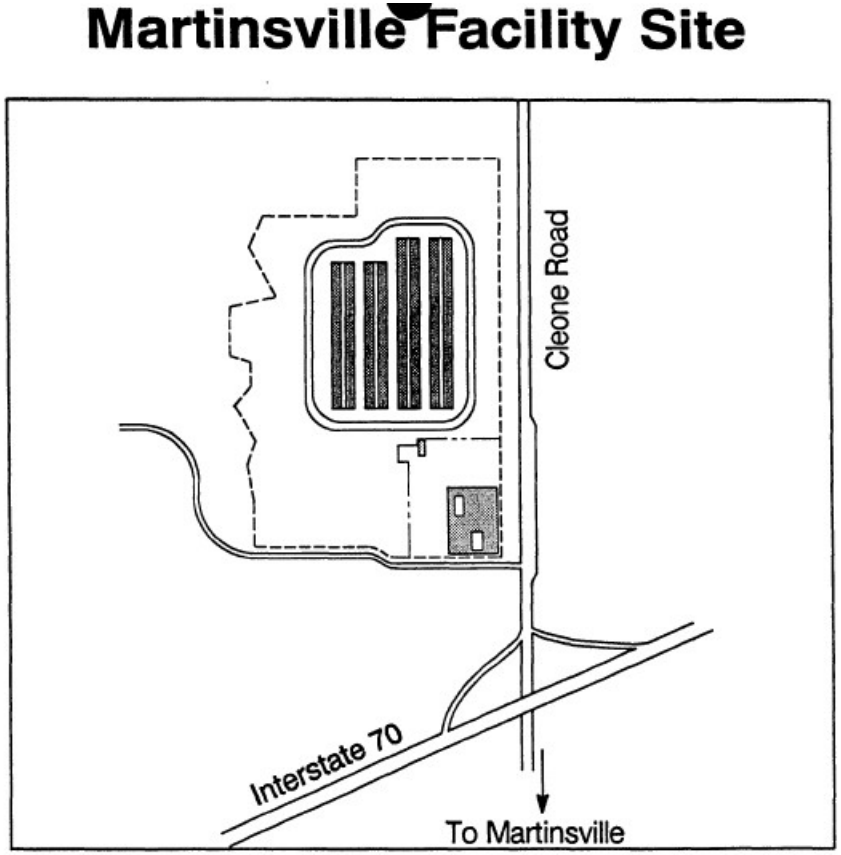
Proposed facility design

The Illinois-Kentucky Compact envisioned that the new facility would hold 10 to 15 million ft^3 of LLRW. It would have a 50-year operating life, and that construction would begin in 1991. 300 acres in size. Deadline: 1993.

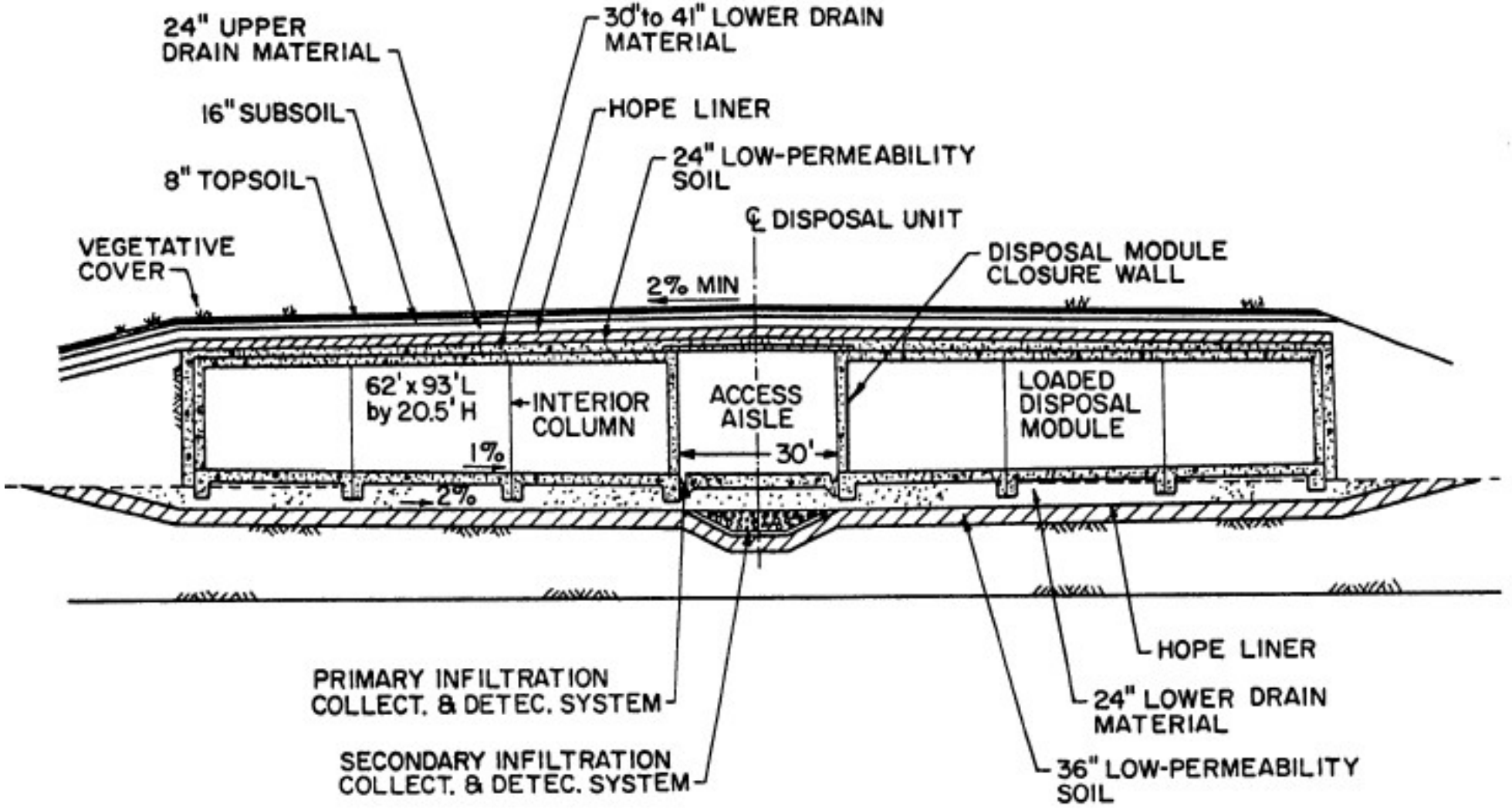
LLRW would be placed in cylindrical and cubic concrete overpacks.


CONCRETE WASTE OVERPACK
(Cylindrical)
Waste Containers
Metal Shielding
(High Activity Wastes)
Cement Grout
HDPE Liner
(Class B/C Wastes)


CONCRETE WASTE OVERPACK
(Rectangular)
Lifting Pin
Waste Containers
Concrete Wall
Forklift Notch
Cement Grout


Martinsville Facility Site
Cleone Road
Interstate 70
To Martinsville

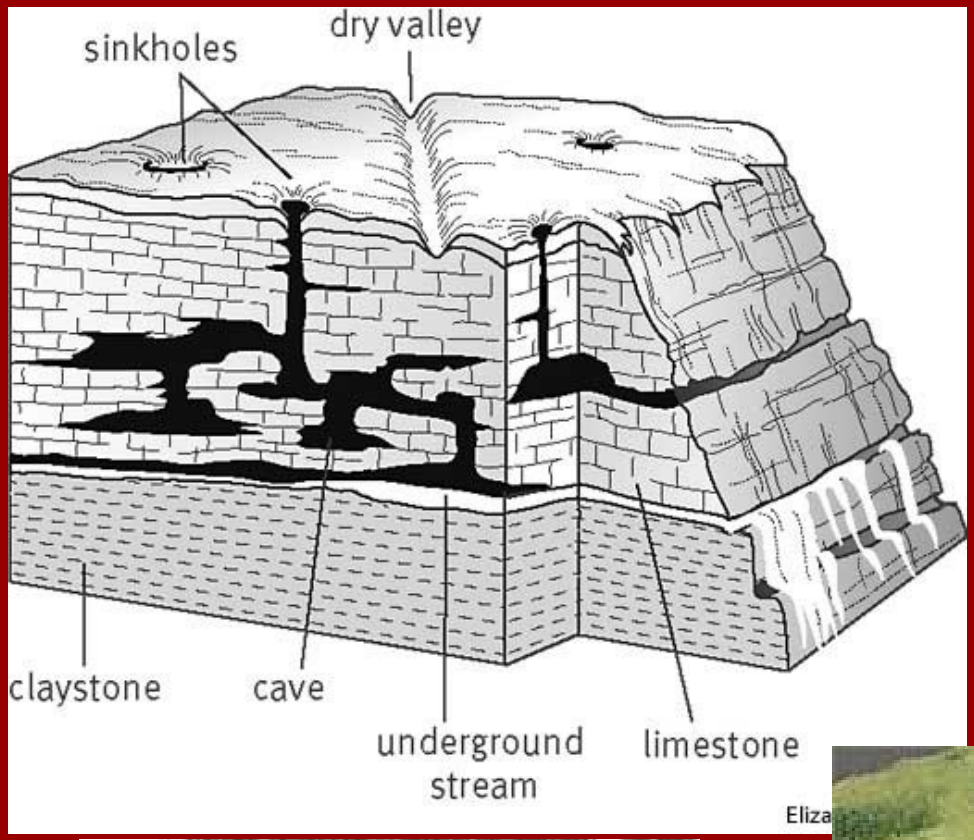
TYPICAL CROSS-SECTION OF DISPOSAL UNIT

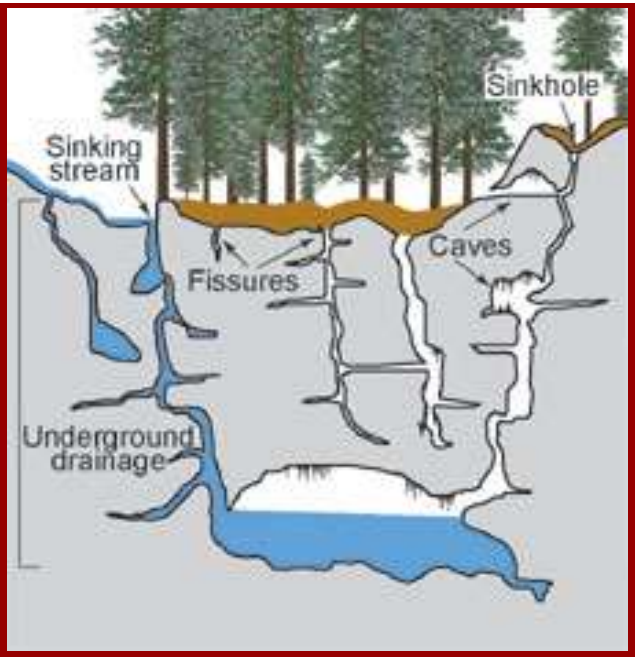


Screening candidate sites as new LLRW facilities

1. Site topography/slopes: avoid erosion, favor flat areas.
2. Water-well inventory: helps establish groundwater flow.
3. Inactive fault zones/fracturing: – pathways for migration
4. Engineering properties: shrinking, swelling, collapse, liquefaction.
5. Local karst: pathways for rapid migration.

Coal mine areas: subsidence.


sinkholes
dry valley
claystone
cave
underground stream
limestone


Sinkhole
Sinking stream
Caves
Fissures
Underground drainage

Timeline

The head of the Division of Nuclear Safety decided that each county had the option to *volunteer* for consideration for a new LLRW facility.

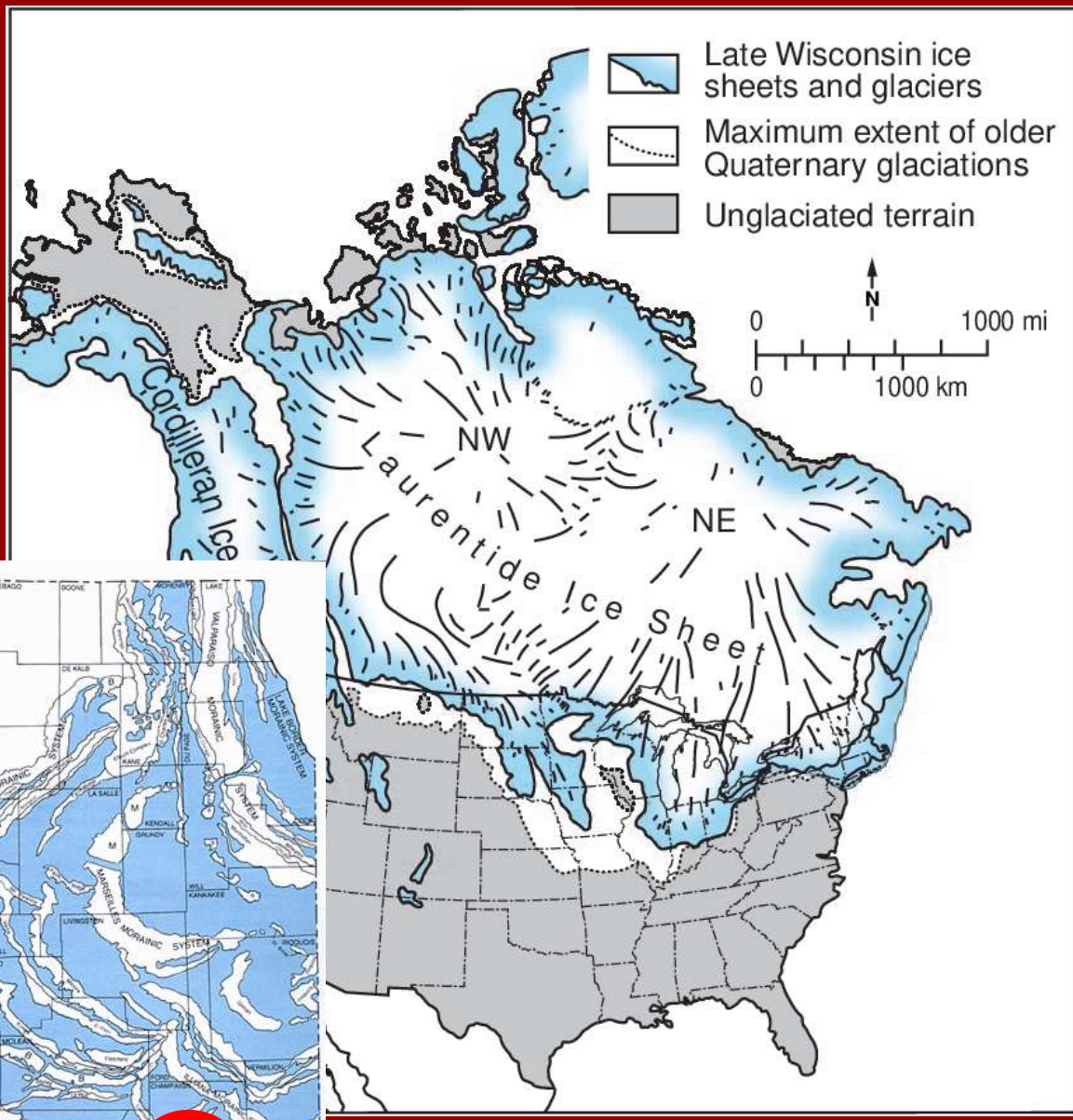
Illinois has 102 counties. At first, 21 counties showed an interest, and preliminary site screening was conducted. Ten sites looked promising. However, each county eventually backed out because of concerns about long-term financial liabilities, and a general fear about radioactive wastes (political opposition).

Timeline

However, the (city of) Martinsville Town Council in Clark County offered a site to the Division of Nuclear Safety. Martinsville: pop. 1,167 (2010). 12% unemployment in 1991.

With only one candidate, the decision was made to conduct a detailed site assessment by the Illinois State Geological Survey, and the Illinois State Water Survey, beginning in 1988.

Where is Martinsville?



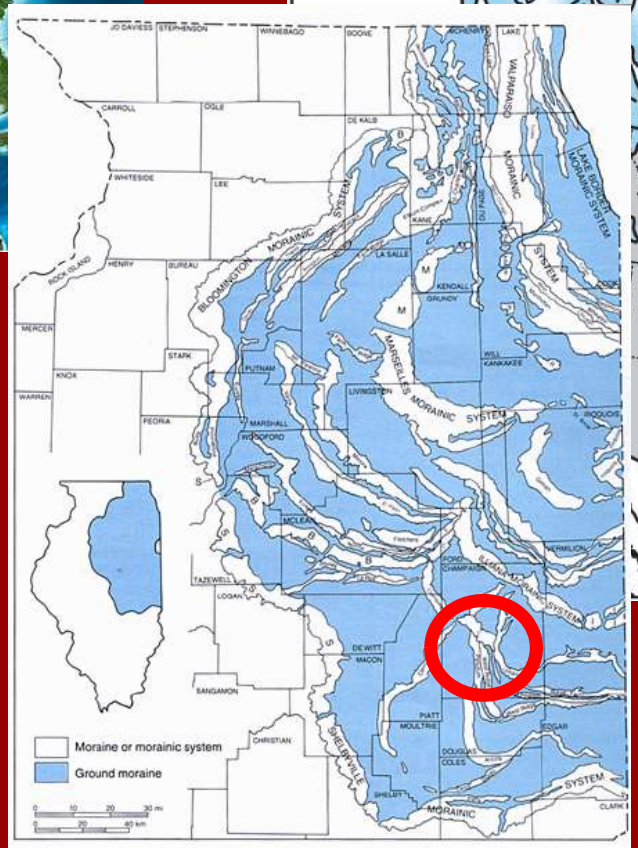


Figure 24 Wisconsin Episode moraines arc across northeastern Illinois and indicate position of temporary stationary ice fronts as the ice retreated.

What Illinois Looked Like During the Ice Age

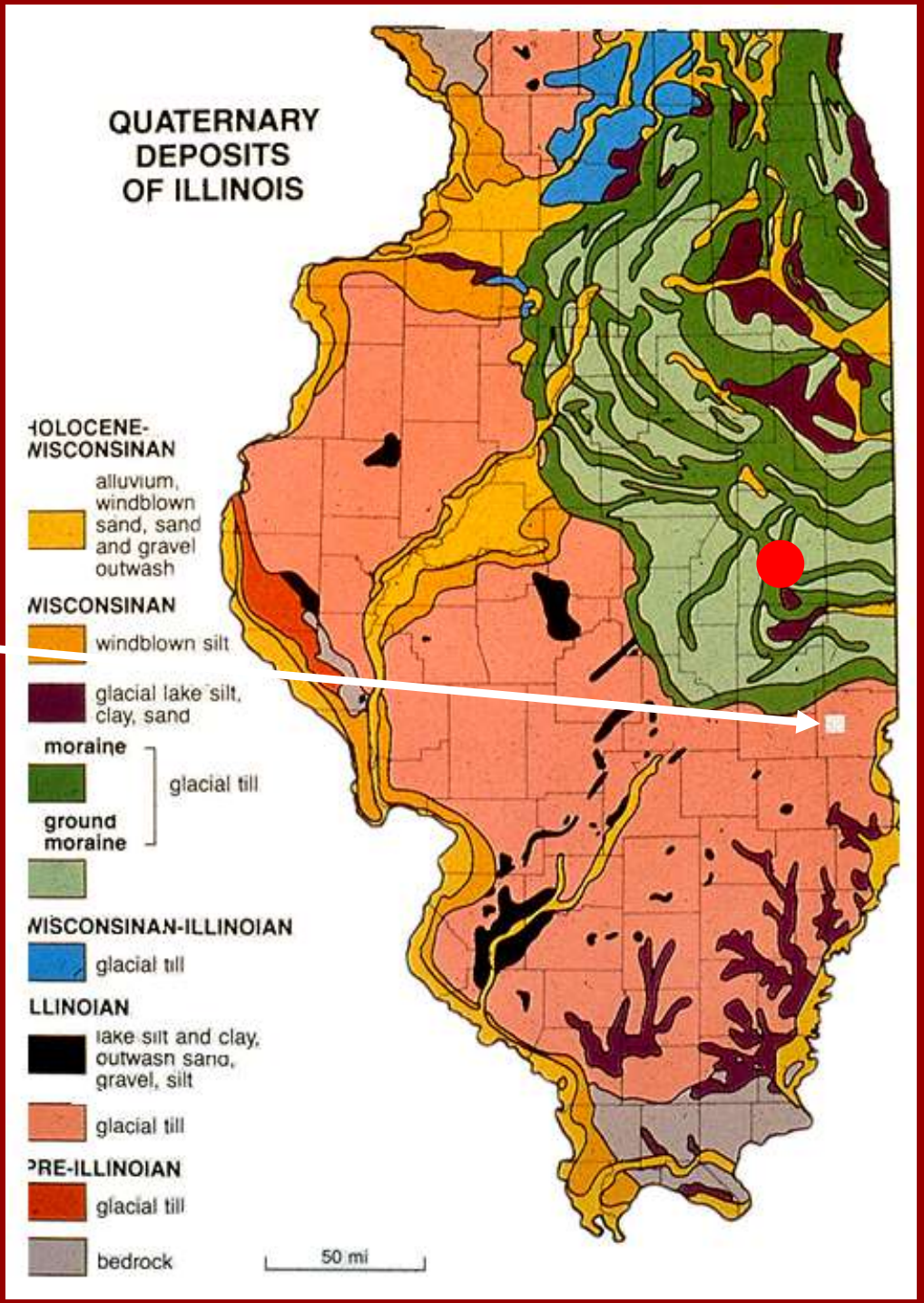
Bylot Island, Nunavut, Canada

What Illinois Looked Like During the Ice Age

In Illinois – Multiple glacial landscapes piled on top of one another.

Martinsville site location

Martinsville City Council welcomed the facility - 100 jobs and fees totaling > $1 million per year.



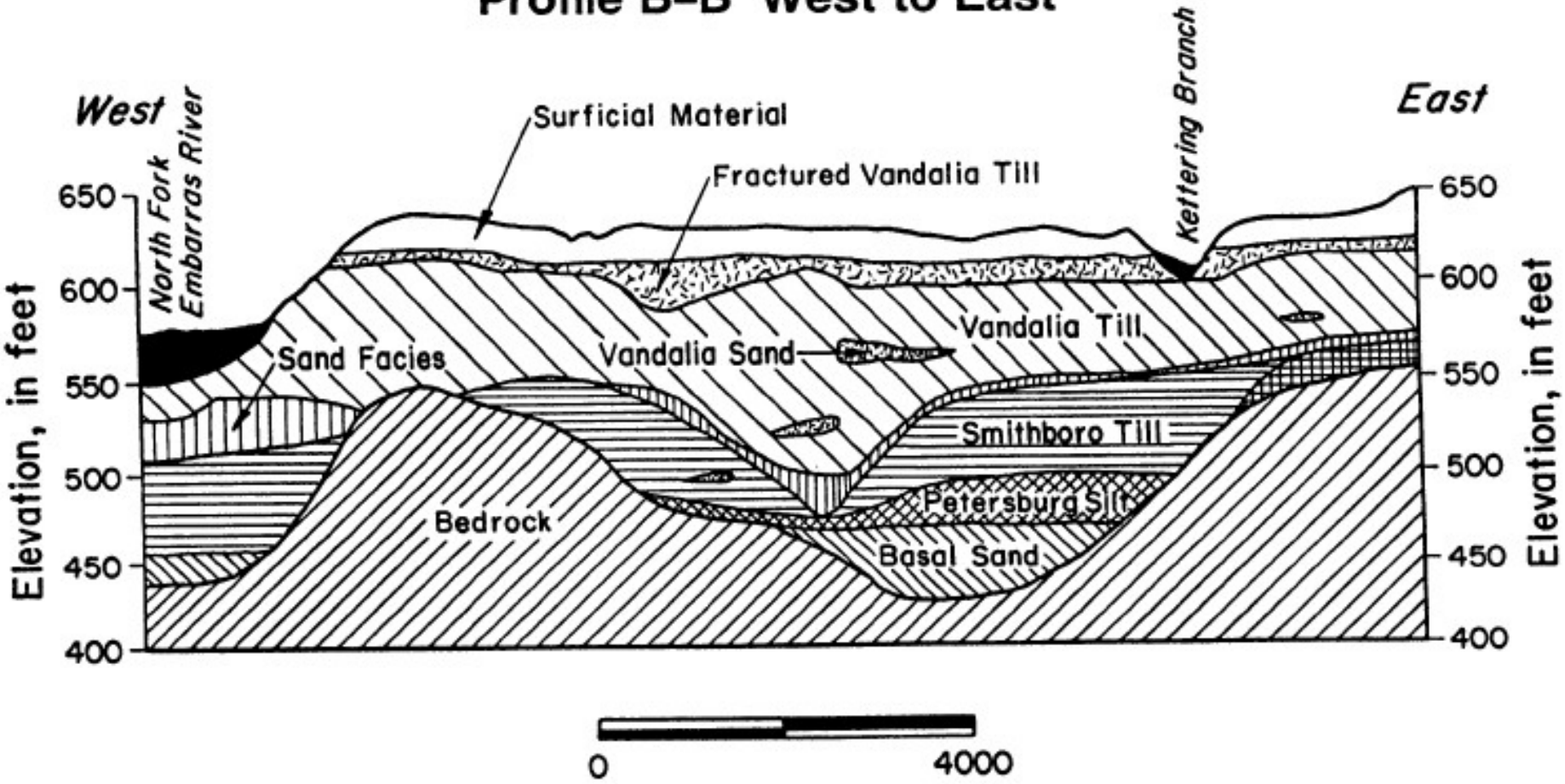
The Illinois State Geological Survey and the State Water Survey were engaged to conduct site characterization studies.

- Base-map construction
- Geological maps
- Landscape stability
- Geophysics
- Drilling program
- Stratigraphy
- Structural features
- Material weathering
- Homogeneity/isotropy
- Engineering properties
- Geochemistry
- Flood-hazard areas
- Surface-water bodies
- Groundwater flow
- Groundwater monitoring
- Vadose-zone studies
- Groundwater modeling

Geological Characterization of Glacial Sediments

Coming soon to a campus near you!

Geology
Profile B–B' West to East



General Characteristics of the Martinsville site

1. A few minor, inactive bedrock faults are present.
2. Surficial materials have sufficient bearing capacities.
3. Relatively deep water table.
4. Relatively flat surrounding the facility.
5. Far from surface water bodies.
6. Outside of high-seismic risk zones.
7. Lacks recoverable mineral resources.
8. Poor groundwater quality, *but* . . .

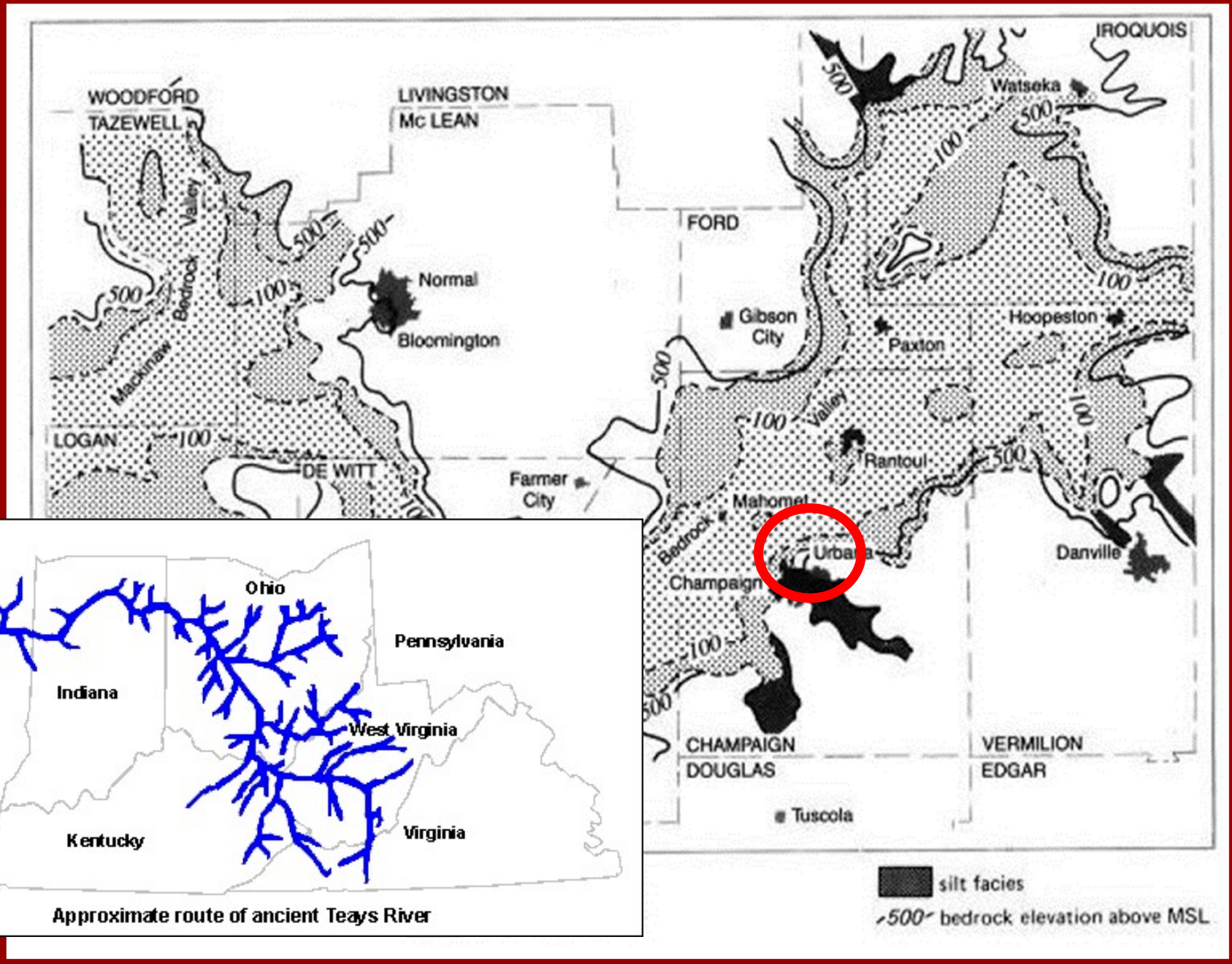
What is an aquifer?

An aquifer is geological layer or group of layers of geomedia (sands or gravel) that are capable of providing enough drinking water to support a well.

The Mahomet Aquifer.

The source of OUR drinking Water.

The Mahomet Aquifer.



Martinsville or Nothing

Fatal flaw: aquifers were discovered.

Do you proceed with more drilling, groundwater investigations, and modeling, with the "hope" that the aquifers may not be as continuous as early results show, and can be overcome if groundwater modeling indicates otherwise?

Martinsville or Nothing

Fatal flaw: aquifers were discovered.

Do you presume that if these features are prevalent, that they can be explained away or can be "engineered" around?

Yes, again because there was no other alternative.

The sequence of events

The overall tone of the site characterization studies was that it was a "good site" but not "flawless."

Because the Martinsville site was the only candidate for the Compact, the Division of Nuclear Safety deleted the word "aquifer" 109 times from the reports.

The sequence of events

1991: The Martinsville hearings followed: 81 days of testimony that cost the State $100,000 each day. Public opposition was fierce. It was discovered that DNS had changed the wording of the characterization reports! Their credibility was greatly damaged.

Local support and opposition

In favor of new jobs: “People for Responsible Opportunities”

Against the facility: “Concerned Citizens of Clark County” because of earthquakes.

“Martinsville Against the Dump” were suspicious of the selection process being fair.

Rumors/perceptions of cattle being shot, property damage, bribes, and a kidnapping attempt of an expert witness by opposition?

Rejected

On Oct. 9, 1992, the Facility Siting Commission rejected Martinsville as LLRW disposal facility. Why?

"Information was not available, not forthcoming, and sometimes produced only from prodding." (*sidebar on being an expert witness*).

"Proponent's case presented by scientists and engineers who were involved in the characterization – no independent 3rd party and the Surveys were not independent."

Why the rejection?

"Politics and need for local approval selected the site. Science and engineering were asked to come in after the fact to justify an politically acceptable site."

"Science and engineering were unable to prove site safety beyond a preponderance of the evidence - burden of proof."

Site Rejection Summary

"Loss of public confidence in the process, therefore, questionable site characterization regardless of it's high quality."

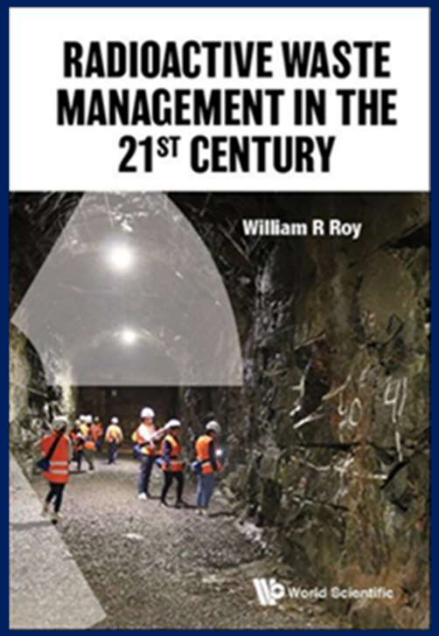
"Inability of site reviewers to understand the 'gray' areas of science/engineering."

"Final thought – If the facility had been constructed, would there have been a problem? Probably not."

—Dr. R. Berg, Illinois State Geological Survey

Class Assignment 6

Read Chapters 5 and 6.



Questions?