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Nuclear Waste Facility Siting in Federal Systems:

Understanding the Structure of Public Preferences in the US

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Overview

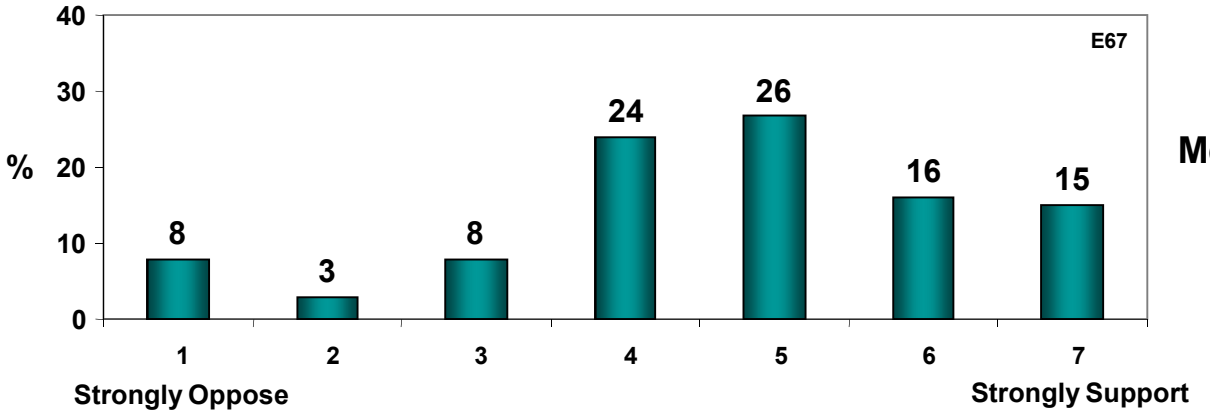
- Evaluating public support for alternative UNF facility siting approaches
- The federal system in the US gives prominence to state and regional differences
- This study evaluates the variation in support for siting approaches across US Census regions
- Differences are significant, reinforcing a siting strategy that permits variation in siting approaches across regions

Measuring Public Views on Complex Policy Issues

- Energy and Environment Survey Project
  - Nation-wide surveys annually, 2006 to present
  - May 2011 Focus on Nuclear Waste Views and Preferences
  - Research funded jointly by Sandia National Laboratories and the University of Oklahoma
- Mixed-mode survey collection required
  - Telephone (May 17 – June 12, 2011, n=593 interviews)
  - Internet (June 1-2 2011, n=2005 interviews)
- Representativeness and Reliability
  - Phone survey cooperation rate – 56.4%
  - Internet survey drawn from demographically and regionally balanced respondent panel maintained by Survey Sampling Inc.
  - Neither mode is sufficient on its own; cross-validation necessary

Geologic Repositories

Two underground mine-like repositories several thousand feet deep; one in east and one in west; secure surface storage buildings; option for retrieval or permanent storage; each meets all technical and safety requirements of federal and state regulatory agencies

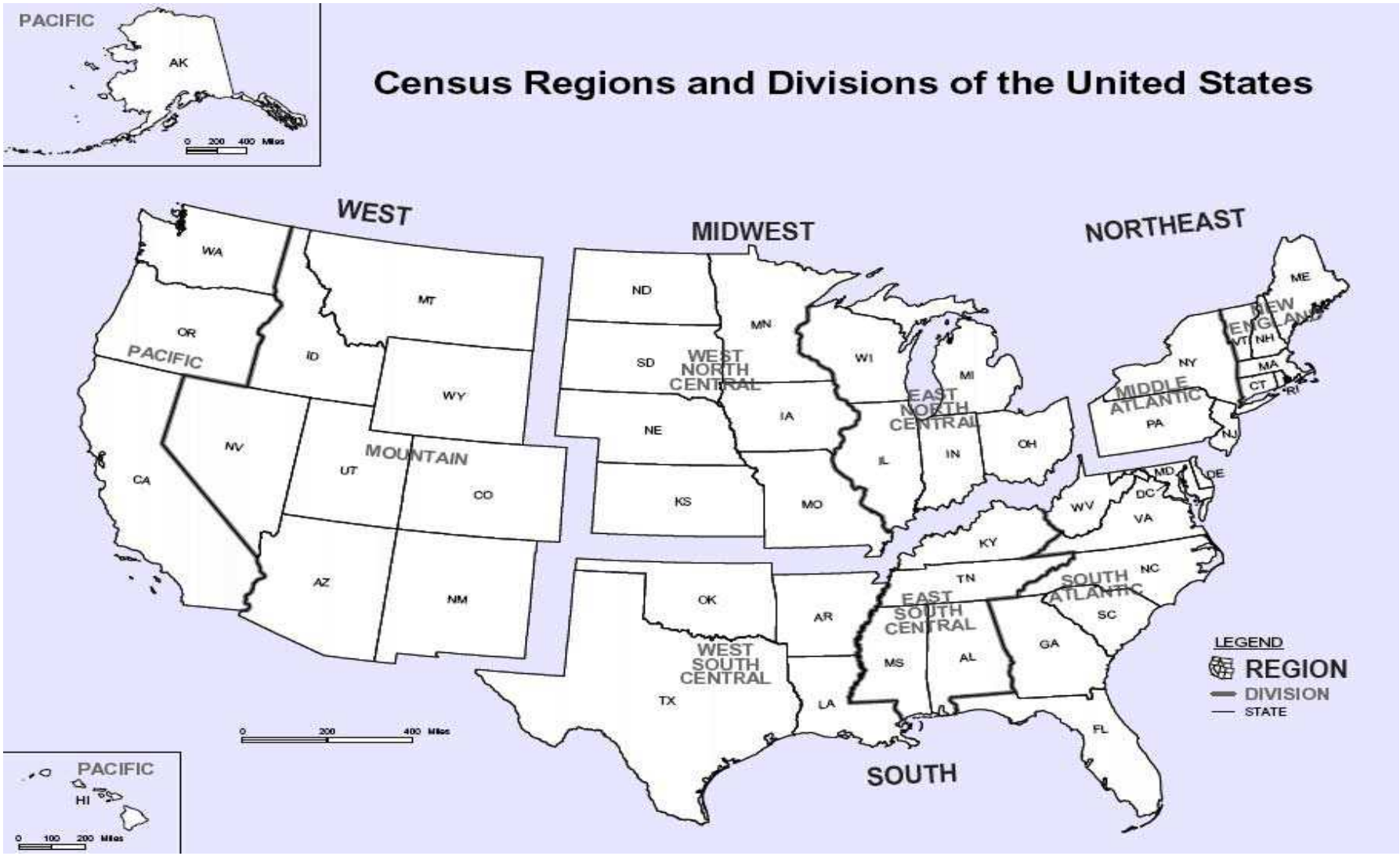


Mean: 2011

4.65

AGE	EDUCATION	GENDER	RACE/ ETHNICITY	INCOME	POLITICAL IDEOLOGY
18–29: 4.70	< Col Grad: 4.56	W: 4.38	Minorities: 4.36	< 50K: 4.58	Liberal: 4.49
30–49: 4.58	Col Grad: 4.76	M: 4.93	Majority: 4.71	50–100K: 4.73	Mod: 4.58
50+: 4.67				> 100K: 4.91	Consv: 4.96

US Census Regions



Support for Repository and Policy Siting Options by Region of US

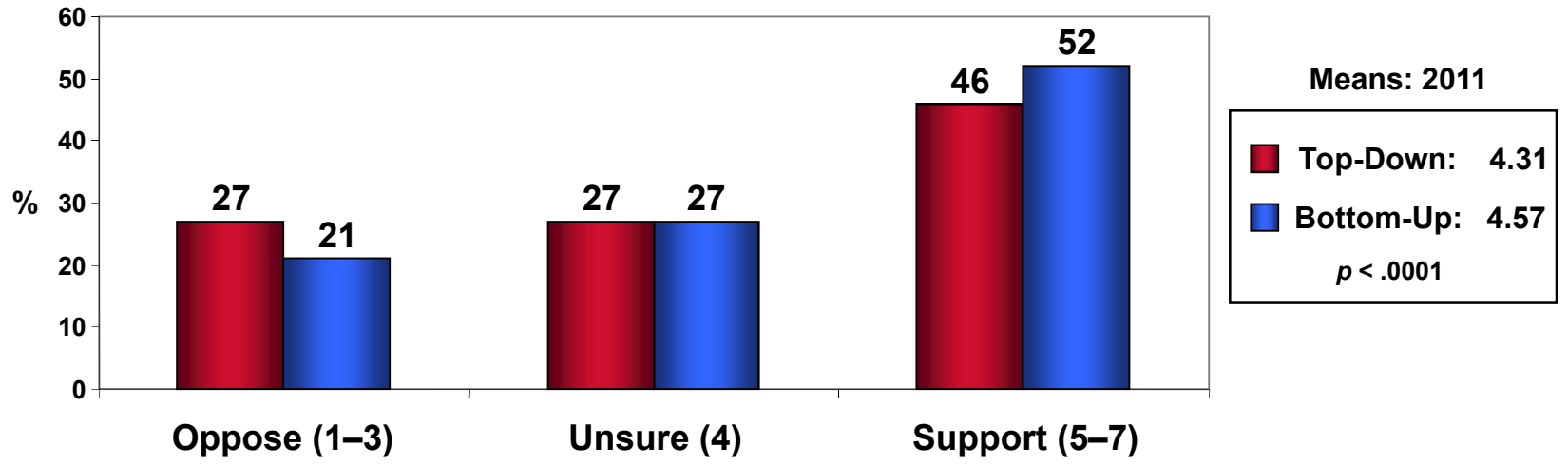
(1=Strongly Oppose, 7=Strongly Support)

Explanatory Variables by Census Regions	Support for Deep 2 Geologic Repositories	Support: with Compensation	Support: if Repository In-State	Sample Size
Overall Mean	4.64 (1.67)	+0.24** (1.76)	-0.31** (SE=0.04)	2201
Pacific (AK, HI, WA, OR, CA)	4.50 (1.76)	+0.12 (SE=0.10)	-0.11 (SE=0.10)	300
Mountain (MT, ID, WY, NV, UT, CO, AZ, NM)	4.66 (1.69)	+0.37** (SE=0.13)	-0.22+ (SE=0.12)	164
West North Central (ND, MN, SD, IA, NE, MO, KS)	4.65 (1.64)	+0.16 (SE=0.13)	-0.46** (SE=0.14)	154
West South Central (OK, AR, TX, LA)	4.64 (1.63)	+0.36** (SE=0.12))	-0.02 (SE=0.12)	185
East North Central (WI, MI, IL, IN, OH)	4.56 (1.66)	+0.31** (SE=0.10)	-0.26** (SE=0.09)	308
New England (ME, VT, NH, MA, CT, RI)	4.81 (1.57)	+0.25* (SE=0.15)	-0.57** (SE=0.16)	104
Middle Atlantic (NY, PA, NJ)	4.61 (1.71)	+0.21* (SE=0.11)	-0.48** (SE=0.12)	255
East South Central (KY, TN, MS, AL)	4.57 (1.64)	+0.47** (SE=0.18)	-0.24+ (SE=0.15)	117
South Atlantic (MD, DE, WV, DC, VA, NC, SC, GA, FL)	4.76 (1.66)	+0.27** (SE=0.08)	-0.43** (SE=0.08)	430

Public Perspectives on Site Selection Approaches

Top-Down: Federal government selects two technically suitable sites for a nuclear repository (one in East; one in West). Federal legislation directs the two states and local communities to host repositories. Federal agencies work with selected states and communities to minimize negative economic, environmental, and social impacts while creating thousands of jobs and large investments.

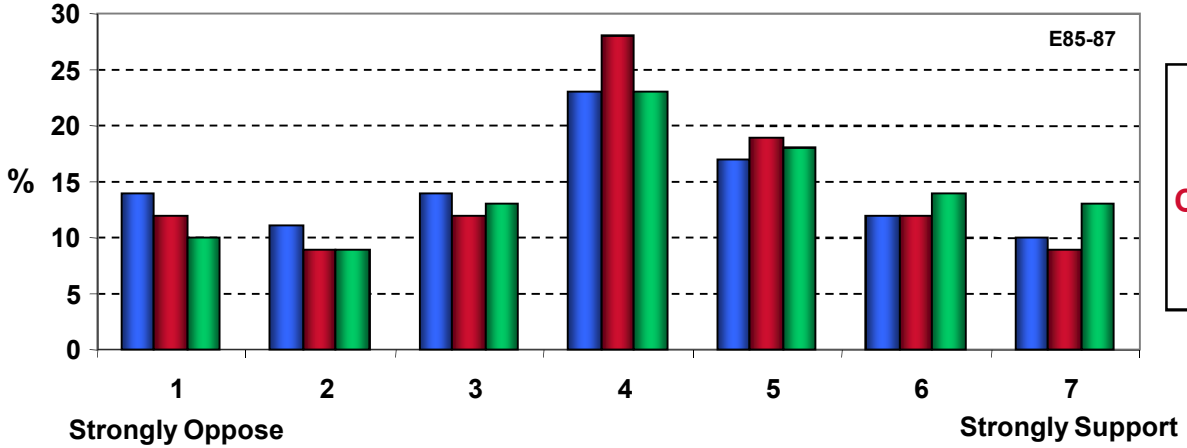
Bottom-Up: States and local communities are invited to apply to host a nuclear repository (one in East; one in West). The two volunteer sites judged most technically suitable are chosen to host repositories. Federal agencies work with selected states and communities to minimize negative economic, environmental, and social impacts while creating thousands of jobs and large investments.



Preferred Role of Governors

(Random Order)

- Advisory only: should not be allowed to overrule federal decisions of where to build nuclear repositories.
- Conditional veto: should be able to veto siting decision, but Congress should be able to override with two-thirds majority.
- Final veto: should be able to veto and Congress should be required to accept governors' vetoes.



Support & Opposition

	% Opp	%Neut	% Suppt
Advisory only:	39	23	39
Conditional Veto:	33	28	40
Final Veto:	32	23	45

Support for Site Selection Processes by Region

Explanatory Variables by Census Regions	Experts Evaluate Sites then Invite Host Sites to Engage	Host Sites Volunteer then Experts Evaluate	Governor has Advisory Role in Site Selection	Governor has Final Veto on Host Site	Sample Size
Response Scale	1=str oppose; 7=str support	Difference	1=str disagree; 7=str agree	Difference	
Overall Mean	4.33 (SD=1.62)	+0.26** (SE=0.04)	3.91 (SD=1.82)	+0.30** (SE=0.07)	2174
Pacific (AK, HI, WA, OR, CA)	4.44 (SD=1.66)	+0.20* (SE=0.10)	4.05 (SD=1.79)	+0.01 (SE=0.20)	300
Mountain (MT, ID, WY, NV, UT, CO, AZ, NM)	4.28 (SD=1.70)	+0.28* (SE=0.14)	3.70 (1.80)	+0.46** (SE=0.27)	163
West North Central (ND, MN, SD, IA, NE, MO, KS)	4.42 (SD=1.56)	+0.18 (SE=0.13)	3.55 (SD=1.74)	+0.70** (SE=0.29)	152
West South Central (OK, AR, TX, LA)	4.23 (SD=1.65)	+0.27* (SE=0.14)	3.60 (SD=1.70))	+0.74** (SE=0.24)	183
East North Central (WI, MI, IL, IN, OH)	4.29 (SD=1.51)	+0.34** (SE=0.09)	3.83 (SD=1.76)	+0.47** (SE=0.20)	309
New England (ME, VT, NH, MA, CT, RI)	4.38 (SD=1.53)	+0.35* (SE=0.15)	4.00 (SD=1.73)	+0.42^{+} (SE=0.32)	106
Middle Atlantic (NY, PA, NJ)	4.34 (SD=1.65)	+0.28* (SE=0.11)	4.20 (SD=1.84)	+0.09 (SE=0.20)	253
East South Central (KY, TN, MS, AL)	4.19 (SD=1.71)	+0.42** (SE=0.18)	3.96 (SD=1.86)	+0.33 (SE=0.30)	121
South Atlantic (MD, DE, WV, DC, VA, NC, SC, GA, FL)	4.37 (SD=1.65)	+0.33** (SE=0.09)	3.97 (SD=1.93)	+0.23^{+} (SE=0.17)	433

Conclusions

- Support for repository siting varies significantly across regions
- Consent based approaches, with greater state role and compensation all increase support, but significant variation in response to these measures is evident across states
  - Larger regional samples needed for more complete characterization of these differences
  - Differences in regions appear to result from sizable variation in levels of trust accorded to federal and state level officials
- It is critical that US policies be designed to enhance trust for all levels of government
  - Greater role for local governments will require greater capacity for involvement and oversight

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Alternative Site Selection Processes: Top-Down and Bottom-Up

"There are at least two alternative approaches for choosing suitable sites for long-term disposition of spent nuclear fuel and other highly radioactive materials. In one approach, technical experts identify ideal sites and then ask affected states and nearby communities to accept a nuclear repository. In the other approach, communities volunteer to host a nuclear repository and then technical experts evaluate the suitability and engineering requirements to meet safety standards. *In each approach, government regulators evaluate whether a site can safely contain nuclear materials for thousands of years using the same safety requirements.*

In this option … technical experts determine to be suitable for hosting nuclear repositories. Federal legislation is passed directing these two states and local affected communities to host a national nuclear repository. … This process places priority on technical experts first finding suitable sites, then working with the affected states and communities to meet their concerns.

In this option, local communities apply and compete to host one national nuclear repository in the western U.S. and one in the east. … the two sites that are judged most suitable by technical experts are chosen to host a national nuclear repository. This process places priority on first finding supportive host communities, then technical experts selecting the most suitable sites among them."

Support for Repository and Policy Siting Options: Question Wording

For the next few questions, assume that construction of two underground mine-like storage facilities is being considered for the storage of spent nuclear fuel. One would be in the eastern U.S., and the other in the west. Each of these sites would include secure surface storage buildings and a mine deep underground where radioactive materials could be isolated from people and the environment and could be designed to allow retrieval or to permanently seal away the materials. The facilities and the mines would be designed to meet all technical and safety requirements set by the U.S. Nuclear Regulatory Commission, the U.S. Environmental Protection Agency, and applicable state regulatory agencies.

Using a scale from one to seven where one means strongly oppose and seven means strongly support, how do you feel about this option?

What would be your level of support if you learned that the states and local communities hosting the sites would receive several billion dollars a year, paid for by revenues from nuclear energy, that could be used for hospitals, roads, and schools?

What would be your level of support if you learned that one of these sites is to be located in your state?