Nuclear Power Plant Site Selection Study

McCallum-Turner
Denver • Washington

McCallum-Turner, Incorporated
Site Selection Experience

Recent Nuclear Power Projects

- Preparation of EPRI Industry Guidance
  - Siting Guide (Principal Investigator)
  - Early Site Permit Model Program Plan
  - Combined Operating License Model Program Plan
  - New Plant Program Development Model
- Participation/Support: NEI ESP and COL Task Forces
- Support to utility program planning for development of new nuclear power plants
- ESP and COL application preparation support:
  - Grand Gulf ESP, Grand Gulf COL, Duke COL, Bellefonte COL
- Eleven siting studies, including 18 of 28 currently announced new nuclear power plant units

Additional Experience

- Nuclear Power Plant Site and Environmental Licensing for:
  - Virgil C. Summer Nuclear Station
  - Allens Creek Nuclear Generating Station
  - Wolf Creek Nuclear Generating Station
  - Calloway Plant Nuclear Generating Station
  - South Texas Project
  - Comanche Peak Steam Electric Station
  - Carroll County Nuclear Station
  - Clinch River Breeder Reactor
- Site Selection for:
  - Coal and lignite-fired power plants
  - High- and low-level radioactive waste facilities
  - Oil and gas-fired power plants
  - Major electric transmission lines
- National Environmental Policy Act (NEPA)
  - 50+ NEPA Projects: Preparation and/or review of EIS, EA, and Environmental Reports

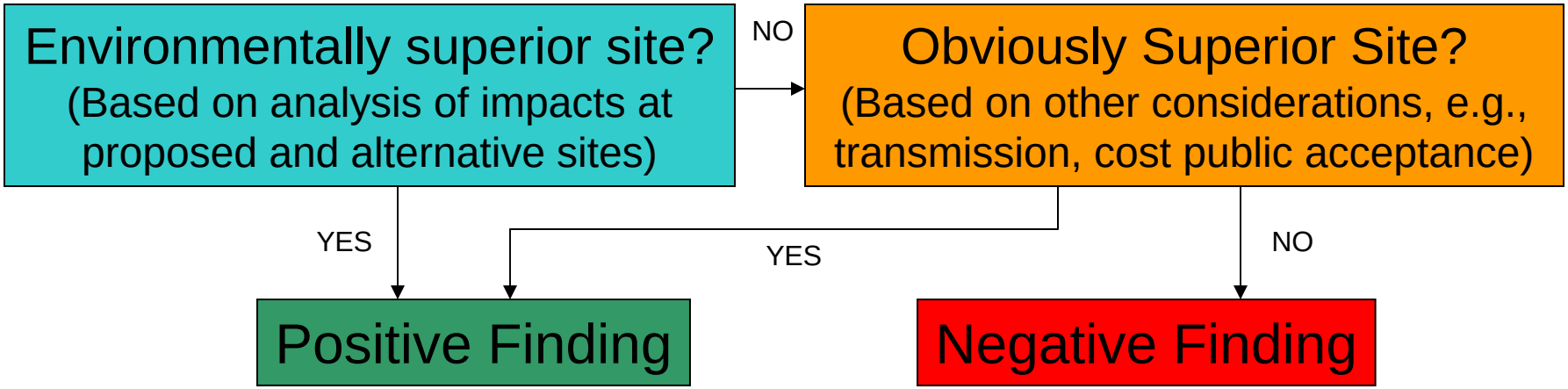
SCE&G Site Selection Objectives

Select a nuclear power plant site that satisfies:

- Applicant's business plans and objectives
- NRC site suitability requirements
- NEPA requirements for the consideration of alternative sites

NRC Guidance on Alternative Sites

- Required finding: The proposed site is one for which no obviously superior alternative exists
- Two-tiered test:



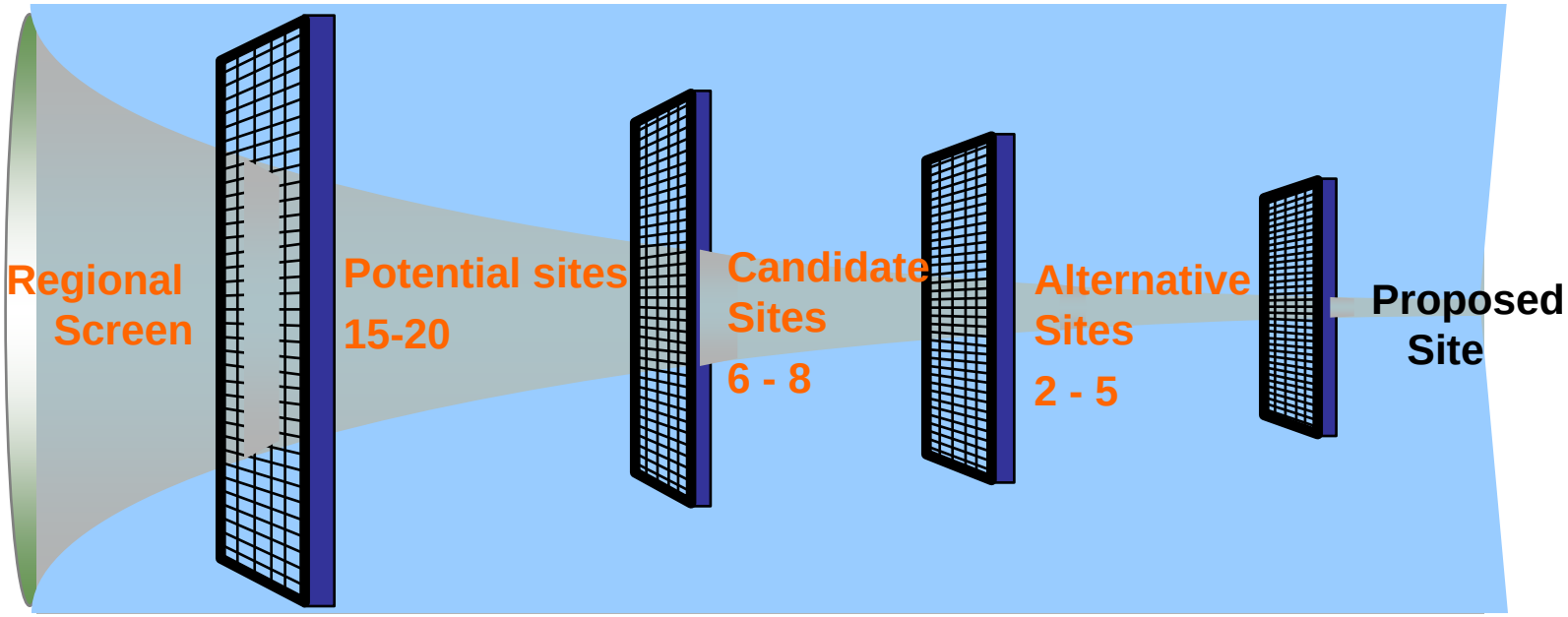
Define Region of Interest

Under NEPA, reasonable alternatives are defined by project objectives (business plan)

ROI is defined by applicant's project objectives

- Examples:
  - Existing nuclear plant sites
  - Service territory
  - Multiple states

Site Screening



SCE&G Process:

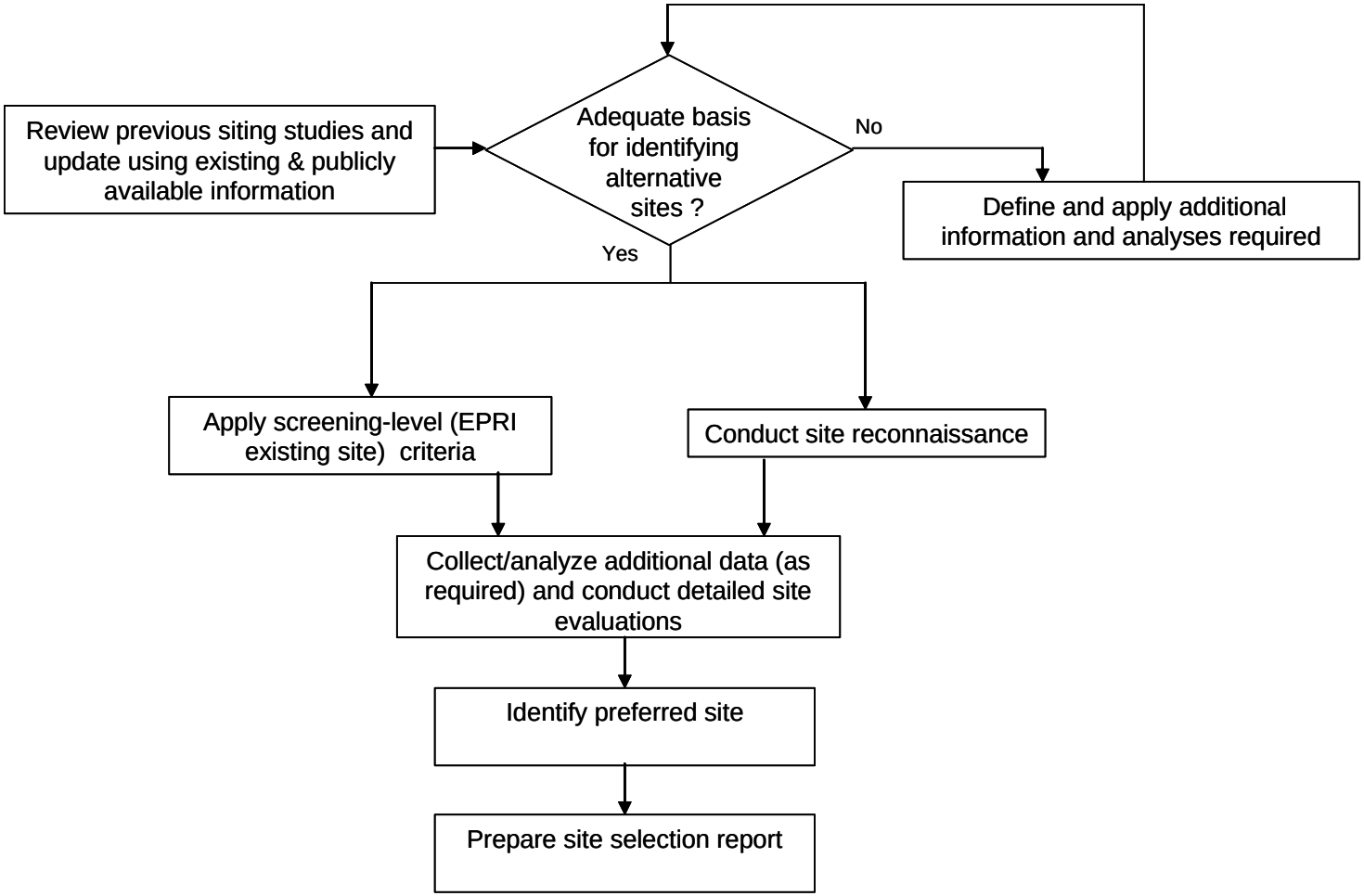
Developed from EPRI *Siting Guide: Site Selection and Evaluation Criteria for an Early Site Permit Application* (Siting Guide), March 2002

NRC Guidance on Existing Sites

NUREG-1555, Section 9.3, III (8))

"Recognize that there will be special cases in which the proposed site was not selected on the basis of a systematic site-selection process. Examples include facilities proposed to be constructed on the site of an existing nuclear power facility previously found acceptable on the basis of a NEPA review and/or demonstrated to be environmentally satisfactory on the basis of operating experience…"

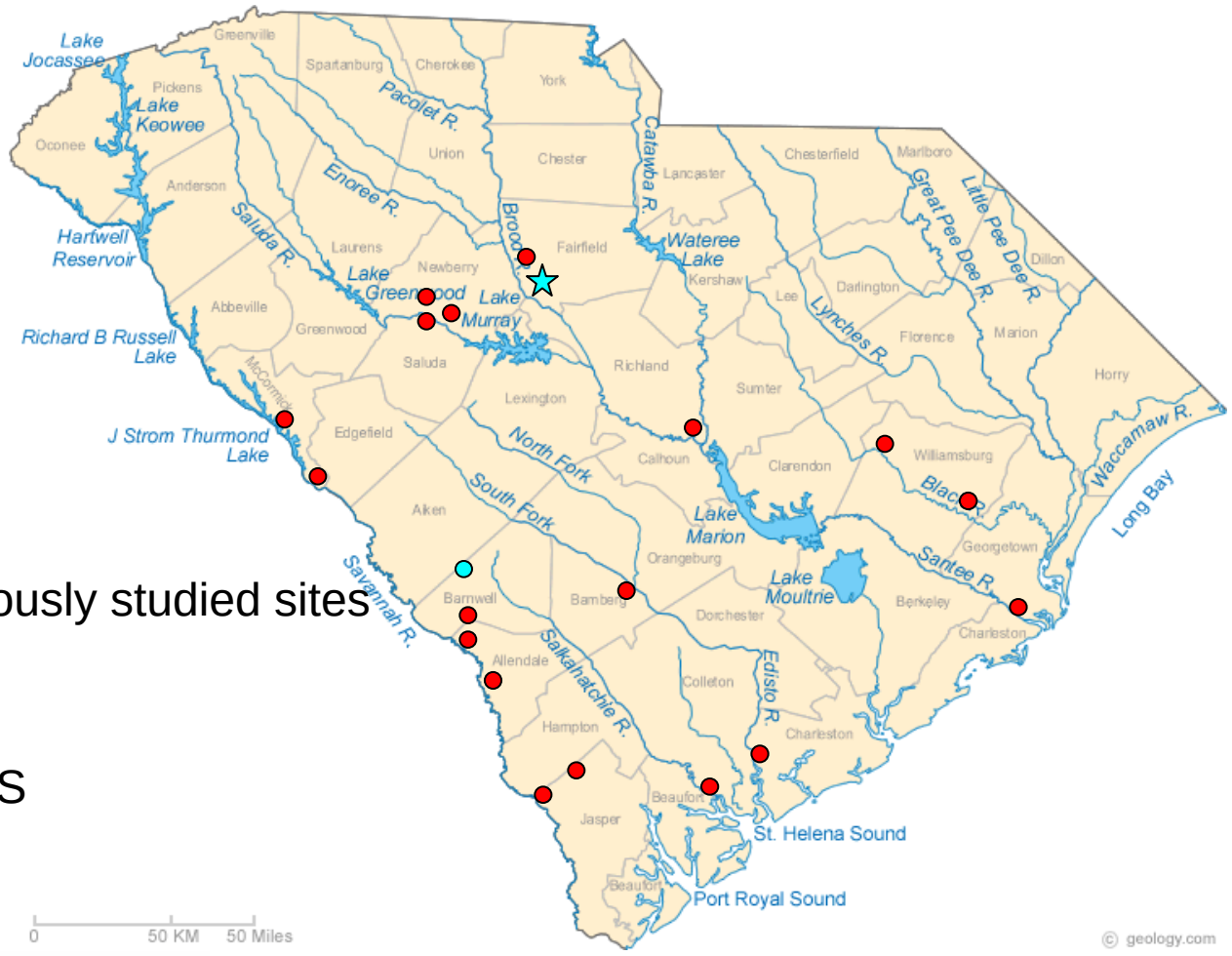
Site Selection – Process Diagram



Scope of Alternatives

- Region of Interest – SCE&G Service Territory
- Potential Sites
  - 18 Previously analyzed
  - VCSNS
  - Savannah River Site
    - In ROI
    - NuStart candidate
    - Local support

Scope of Alternatives



- Previously studied sites
- SRS
- ☆ VCSNS

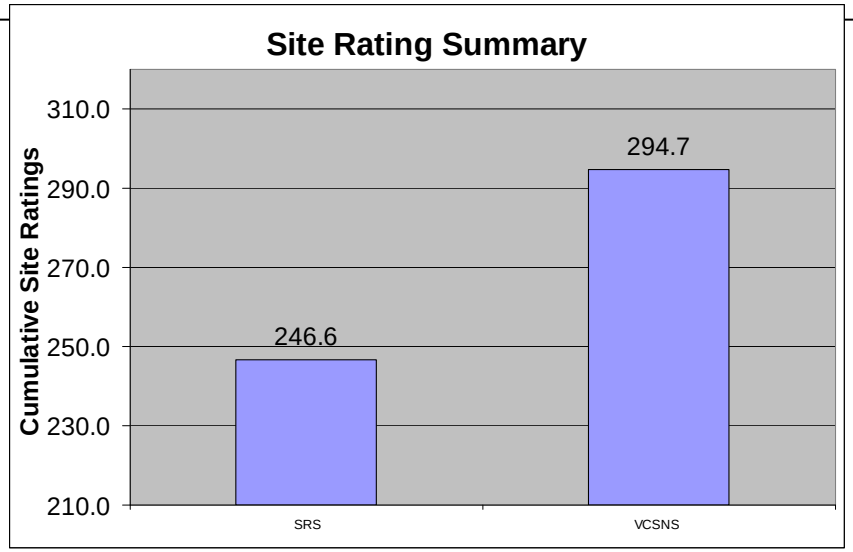
Initial Evaluation

- Reviewed previous siting studies to examine whether any of the sites considered appeared to be significantly more favorable than VCSNS with respect to, e.g.,
  - Water supply
  - Seismic
  - Environmental and land use conditions
  - Existing infrastructure
- Conclusion: None of the previously evaluated sites have characteristics that would make them "obviously superior" to VCSNS as the site for a new nuclear power plant, especially considering its:
  - Status as an existing nuclear power plant site,
  - Availability of adequate land and water for new units,
  - Availability of existing transportation and transmission infrastructure, and
  - Favorable location with respect to SCE&G loads.

- *Accordingly, the balance of this study focused on comparison of VCSNS and SRS as candidate sites for the SCE&G COL.*

Screening Evaluation

	Criterion										
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	**Composite Site Rating**
	Cooling Water Supply	Flooding	Popula-tion	Hazard-ous Land Uses	Ecology	Wetlands	Railroad Access	Transmis-sion Access	Geology & Seismic	Land Acquisi-tion	
	Weight Factor										
Potential Site Name	**9.8**	**4.4**	**8.6**	**5.9**	**5.6**	**5.6**	**6.7**	**7.4**	**9.8**	**6.3**	
	Site Ratings										
SRS	3.5	5	4	4	4	4	4.79	1.00	2	4.5	**246.6**
VCSNS	4	5	4	4	4	4	4.96	4.94	3	5	**294.7**



General Criteria Evaluation

Siting Criteria	Siting Criteria
Health and Safety Criteria: Accident Cause-Related Criteria	**Environmental Criteria: Operational-Related Effects on Aquatic Ecology, cont'd.**
Geology and Seismology	Entrainment/Impingement effects
Cooling System Requirements: Cooling Water Supply	Dredging/Disposal Effects
Cooling Water System: Ambient Temperature Requirements	**Environmental Criteria: Operational-Related Effects on Terrestrial Ecology**
Flooding	Drift Effects on Surrounding Areas
Nearby Hazardous Land Uses	**Socioeconomic Criteria**
Health and Safety Criteria: Accident Effects-Related	Socioeconomic – Construction Related Effects
Extreme Weather Conditions	Socioeconomics – Operation
Population	Environmental Justice
Emergency Planning	Land Use
Atmospheric Dispersion	**Engineering and Cost Related Criteria: Health and Safety Related Criteria**
Health and Safety Criteria: Operational Effects-Related	Water Supply
Surface Water- Radionuclide Pathway	Pumping Distance
Groundwater Radionuclide Pathway	Flooding
Air Radionuclide Pathway	Civil Works
Air-Food ingestion pathway	Brownfield Site Remediation (if applicable)
Surface Water – food radionuclide pathway	Water Supply
Transportation Safety	**Engineering and Cost: Transportation or Transmission Related Criteria**
Environmental Criteria: Construction-Related Effects on Aquatic Ecology	Railroad Access
Disruption of Important Species/Habitats	Highway Access
Bottom Sediment Disruption Effects	Barge Access
Environmental Criteria: Construction-Related Effects on Terrestrial	Transmission Cost and Market Price Differentials
Disruption of Important Species/Habitats and Wetlands	**Engineering and Cost- Related Criteria: Related to Socioeconomic & Land Use**
Dewatering Effects on Adjacent Wetlands	Topography
Environmental Criteria: Operational-Related Effects on Aquatic Ecology	Land Rights
Thermal Discharge Effects	Labor Rates

General Criteria Evaluation

Health & Safety

Criterion		Weight Factor	SRS		VCSNS	
			Rating	Score	Rating	Score
1.1.1	Geology/Seismology	**3.77**	2	7.54	3	11.31
1.1.2	Cooling System Requirements	**3.27**	3.5	11.45	4	13.08
1.1.3	Flooding	**2.4**	5	12	5	12
1.1.4	Nearby Hazardous Land Uses	**3.35**	3	10.05	3	10.05
1.1.5	Extreme Weather Conditions	**2.36**	4	9.44	4	9.44
1.2	Accident Effect Related	**4.09**	4	16.36	5	20.45
1.3.1	Surface Water – Radionuclide Pathway	**2.5**	5	12.5	4	10
1.3.2	Groundwater Radionuclide Pathway	**2.55**	4	10.2	4.5	11.475
1.3.3	Air Radionuclide Pathway	**2.5**	5	12.5	5	12.5
1.3.4	Air-Food Ingestion Pathway	**2.5**	3	7.5	4	10
1.3.5	Surface Water-Food Radionuclide Pathway	**2.41**	5	12.05	5	12.05
1.3.6	Transportation Safety	**2.14**	5	10.7	5	10.7

General Criteria Evaluation

Ecology/Environmental

Criterion		Weight Factor	SRS		VCSNS	
			Rating	Score	Rating	Score
2.1.1	Disruption of Important Species/Habitats	**2.64**	4	10.56	4	10.56
2.1.2	Bottom Sediment Disruption Effects	**2.14**	3	6.42	4	8.56
2.2.1	Disruption of Important Species/Habitats and Wetlands	**3.18**	4	12.72	4	12.72
2.2.2	Dewatering Effects on Adjacent Wetlands	**2.77**	4	11.08	4	11.08
2.3.1	Thermal Discharge Effects	**3.64**	4	14.56	4	14.56
2.3.2	Entrainment/Impingement Effects	**3.23**	4	12.92	5	16.15
2.3.3	Dredging/Disposal Effects	**2.36**	3	7.08	3.5	8.26
2.4.1	Drift Effects on Surrounding Areas	**2.36**	4	9.44	4	9.44

General Criteria Evaluation

Socioeconomics

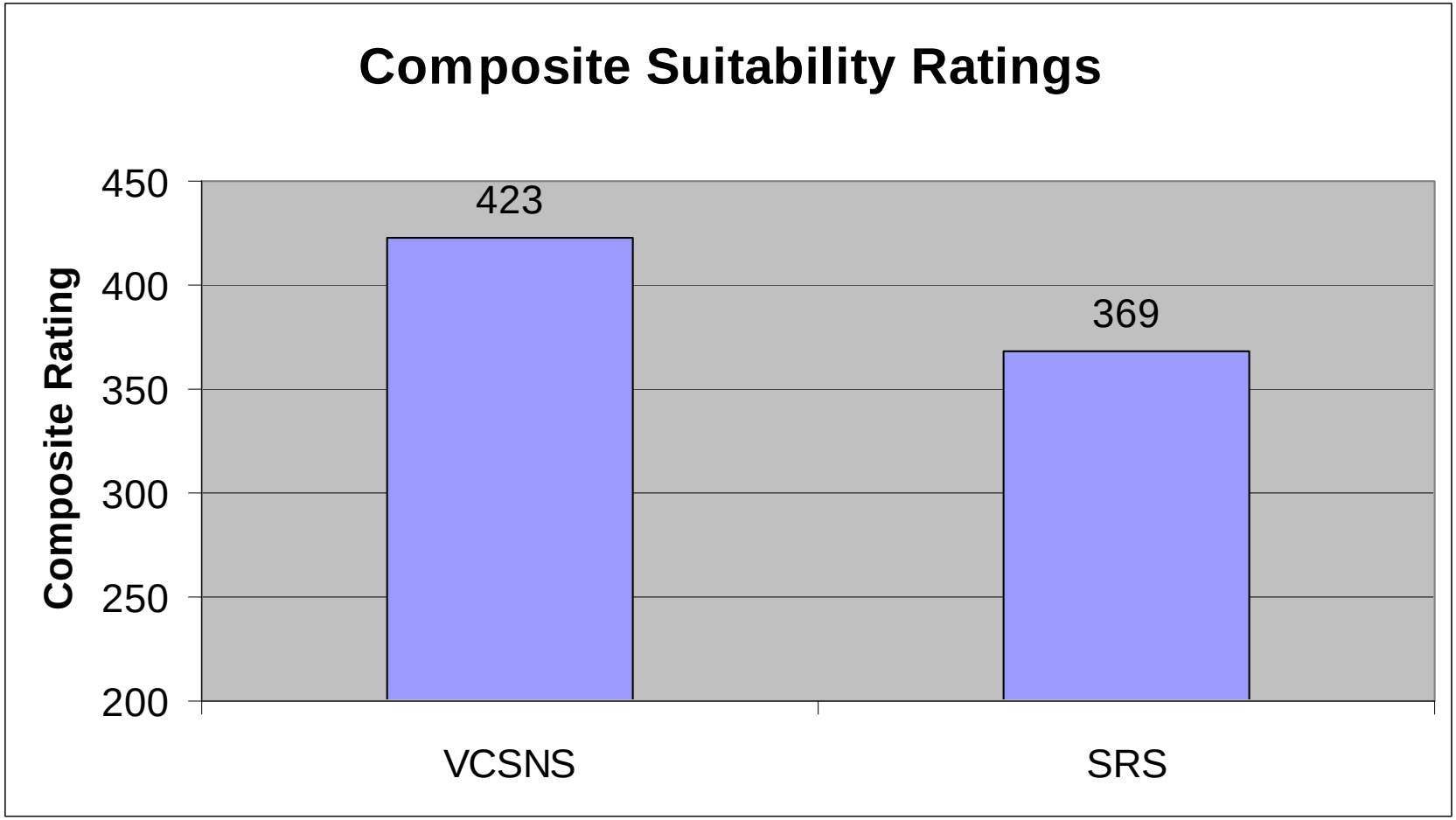
Criterion		Weight Factor	SRS		VCSNS	
			Rating	Score	Rating	Score
3.1.1	Socioeconomics – Construction – Related Effects	**2**	5	10	5	10
3.3.1	Environmental Justice	**1.95**	5	9.75	5	9.75
3.4.1	Land Use	**3.8**	5	19	5	19

General Criteria Evaluation

Engineering/Cost

Criterion		Weight Factor	SRS		VCSNS	
			Rating	Score	Rating	Score
4.1.1	Water Supply	**3.7**	3	11.1	5	18.5
4.1.2	Pumping Distance	**3.05**	3	9.15	5	15.25
4.1.3	Flooding	**2.9**	5	14.5	5	14.5
4.1.5	Civil Works	**3.4**	3	10.2	3	10.2
4.2.1	Railroad Access	**2.6**	4	10.4	5	13
4.2.2	Highway Access	**2.8**	3	8.4	5	14
4.2.3	Barge Access	**2.85**	5	14.25	1	2.85
4.2.4	Transmission Access	**4.8**	1	4.8	5	24
4.3.1	Topography	**2.55**	3	7.65	4	10.2
4.3.2	Land Rights	**2.75**	4.5	12.38	5	13.75
4.3.3	Labor Rates	**3.3**	3	9.9	4	13.2
	Composite Site Rating			**369**		**423**

General Criteria Evaluation



Proposed Site: VCSNS

- Ranked higher in 14 of the general site criteria (versus rating lower in only two)
- Rated as more suitable in the overall composite ratings.
- Existing nuclear power plant site
  - Proven suitable site
  - Transmission infrastructure
  - Adequate land
  - Public acceptance