Sea Level Rise and Groundwater Sourced Community Water Supplies in Florida

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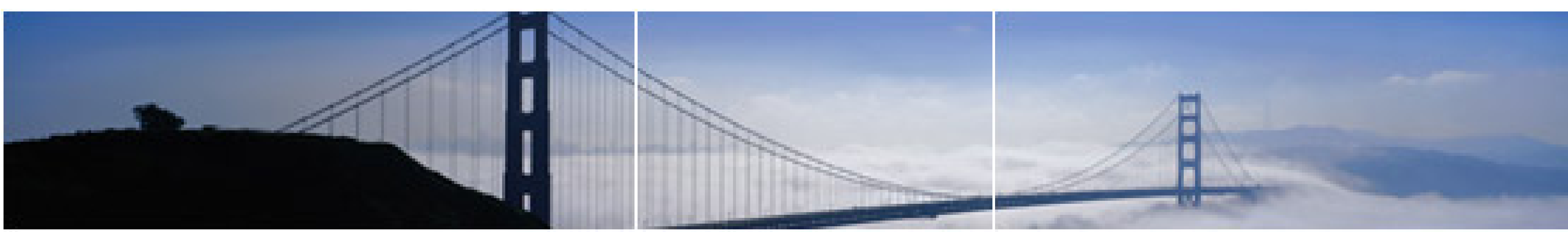


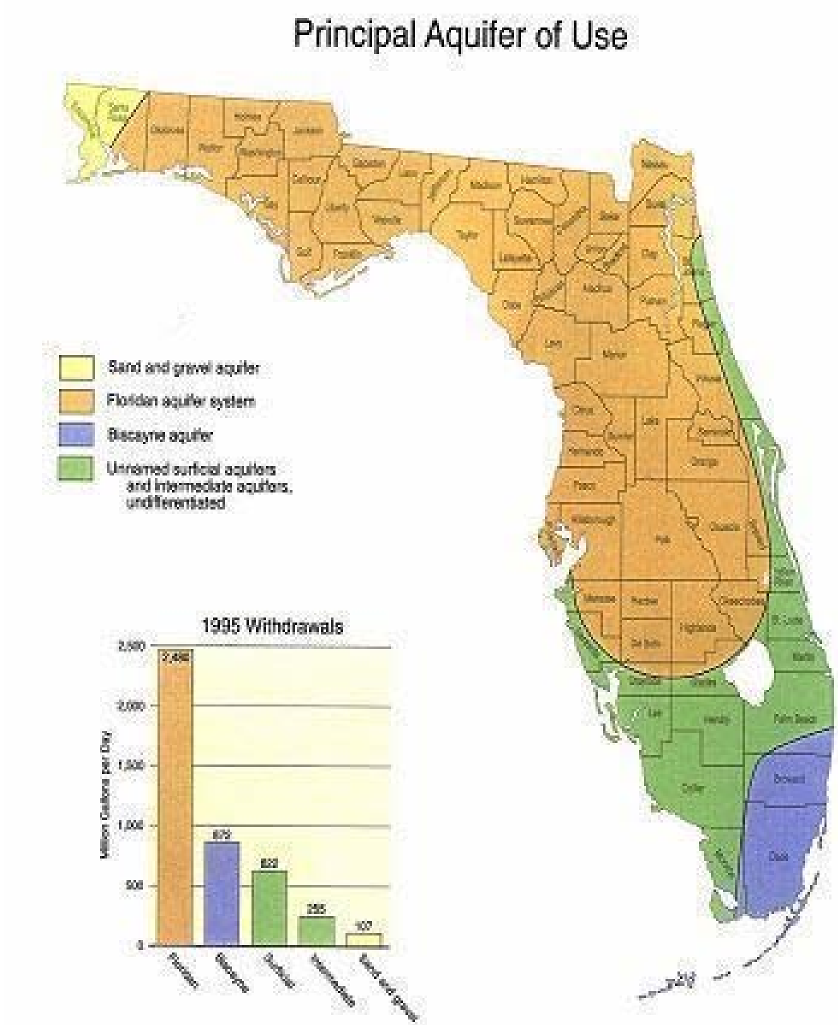
Background

- Sea Level Rise is among the most certain impacts of climate change
- Salt water intrusion is directly tied to sea level
- Community Water Supplies (CWS) are among the highest-value uses of water
- Site-specific hydrogeological assessment and monitoring is resource-intensive
- Decision support is needed to set priorities for assessing and protecting CWS

Objectives

- Develop screening tools to characterize
  - Vulnerability of groundwater-supplied CWS to saltwater intrusion
  - Reliance on current aquifer
- Develop a priority-setting framework based on vulnerability and aquifer reliance
- Demonstrate the framework with coastal CWS in FL

Relevance to CWS in Florida



Source: Fernald, E.A., and E.D. Purdum, 1998. *Water Resources Atlas of Florida*. Institute of Science and Public Affairs, FSU

- Very high reliance on GW (~93% of population)
- Strong water resource management programs
- Excellent availability of data
    - Lat and long of CWS
    - DRASTIC scoring of aquifers
    - Concern about salt water intrusion

Assessing Vulnerability

- DRASTIC developed by EPA & Nat'l Water Well Assoc in 1987
- Widely applied to evaluate vulnerability to contamination
- Basic assumption: contamination is introduced at the ground surface and leaches into ground water via infiltration
- Modified to account for saltwater intrusion caused by sea level rise, which intrudes laterally (or in some cases upward) into aquifers

Modifying DRASTIC

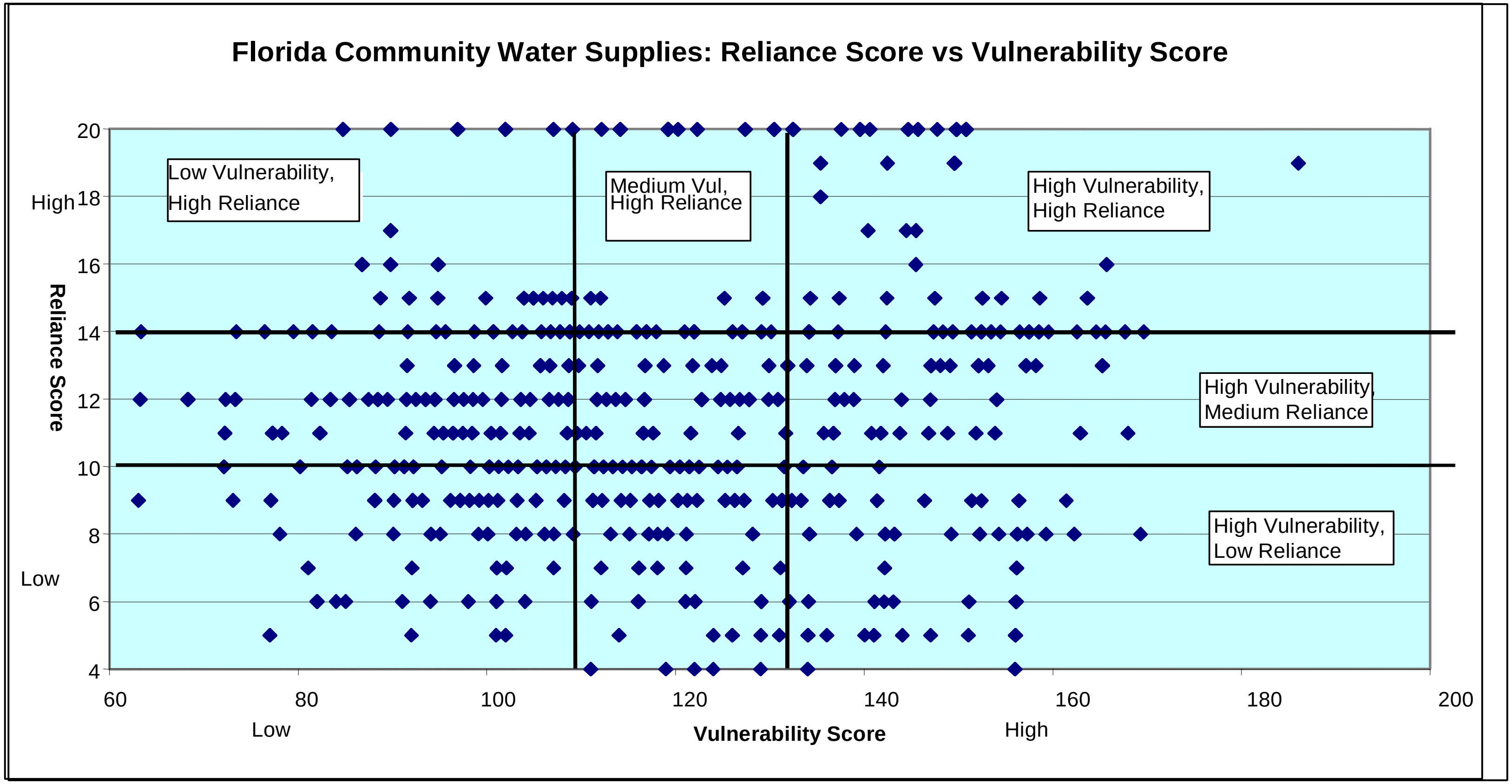
- Original system -- vulnerability to surface pollution = D + R + A + S + T + I + C, where:
  - D - Depth to Water
  - R - Net Recharge
  - A - Aquifer Media
  - S - Soil Media
  - T- Topography
  - I - Impact of Vadose Zone
  - C - Conductivity

- Modified system: SLR Vulnerability = D + R + A +T + I + C + M + P, where
  - D (Depth to Water) ranges from 1 (0-5 ft.) to 10 (100+ ft.)
  - **R (Net Recharge) ranges from 10 (0-2 in./yr) to 2 (10+ in./yr)**
  - A (Aquifer Media) ranges from 2 (massive shale) to 10 (karst limestone)
  - T (Topography) ranges from 1 (18% slope) to 10 (0-2% slope)
  - **I (Impact of Vadose Zone) ranges from 10 (confining layer) to 1 (karst limestone)**
  - C (Conductivity) ranges from 1 (1-100 gpd/sq.ft.) to 10 (2000+ gpd/sq.ft.)
  - **M (Miles to Coastline) ranges from 1 (more than 4.35 miles) to 10 (less than 0.31 miles)**
  - **P (Potentiometric Surface, i.e., water-table elevation) ranges from 1 (greater than 3 feet) to 10 (less than 0.5 feet)**

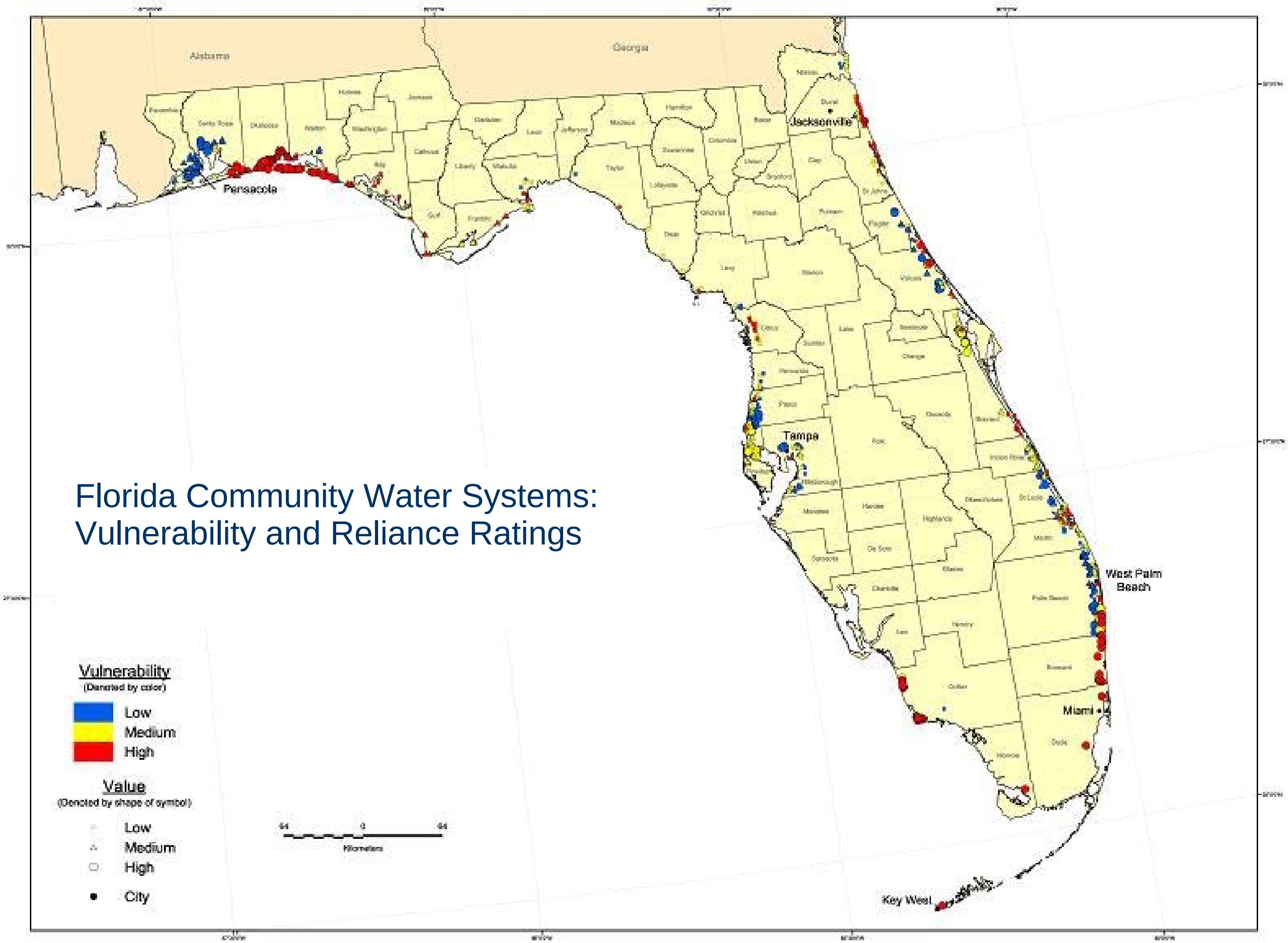
Evaluating Aquifer Reliance

- Reliance = 2 * log(Pop served) + AWS
- Population served
  - Min = 25 (for a mobile home park)
  - Max = 475,000 (for Tampa)
- Availability of alternative water supplies (AWS)
  - Biscayne Aquifer (designated by SDWA as sole-source aquifer) = 10
  - Water resource caution areas (designated by regional water management districts) = 5
  - All others = 1

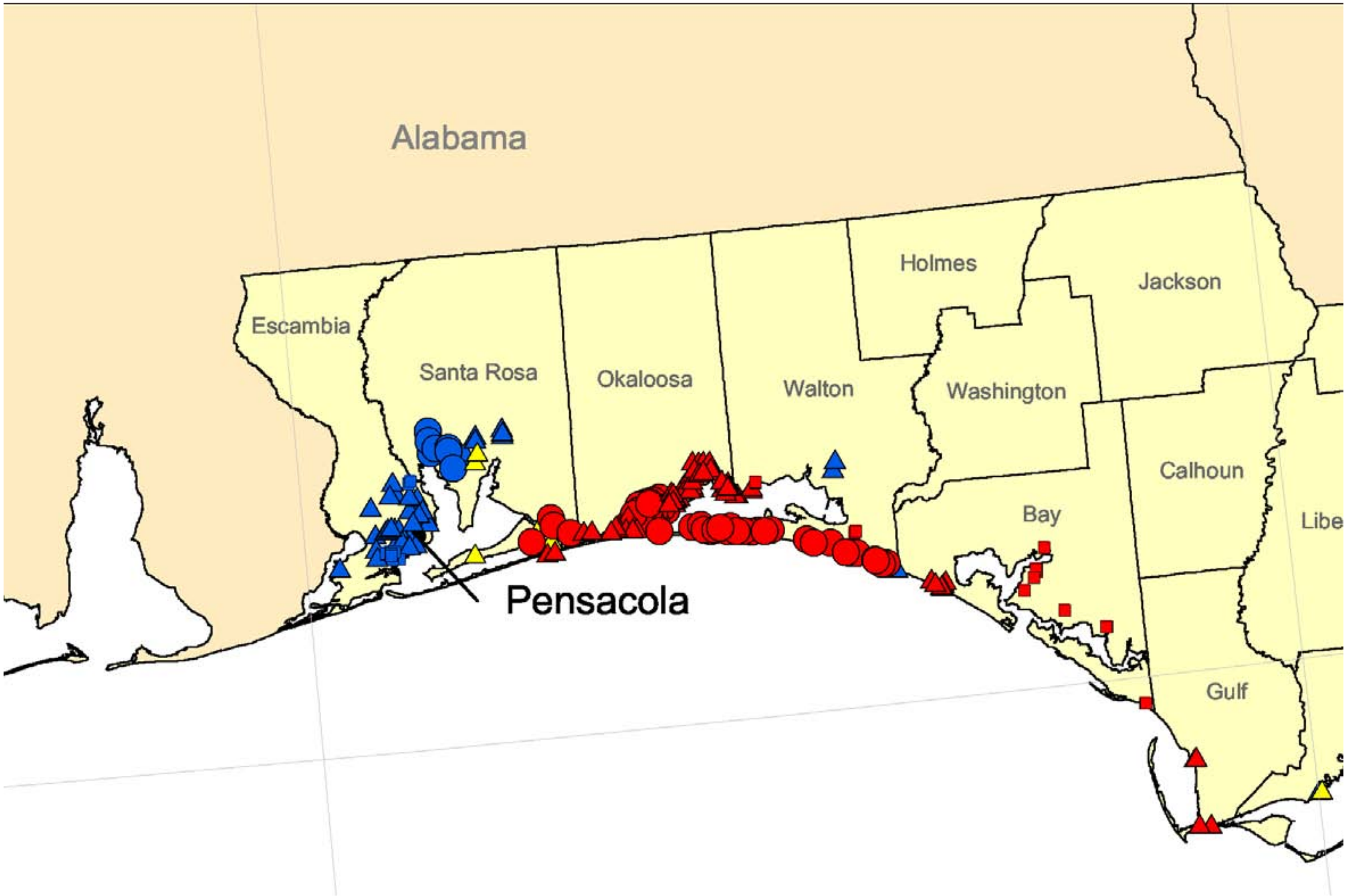
Vulnerability and Reliance



Mapping Vulnerability and Reliance



Pensacola


Alabama
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Okaloosa
Walton
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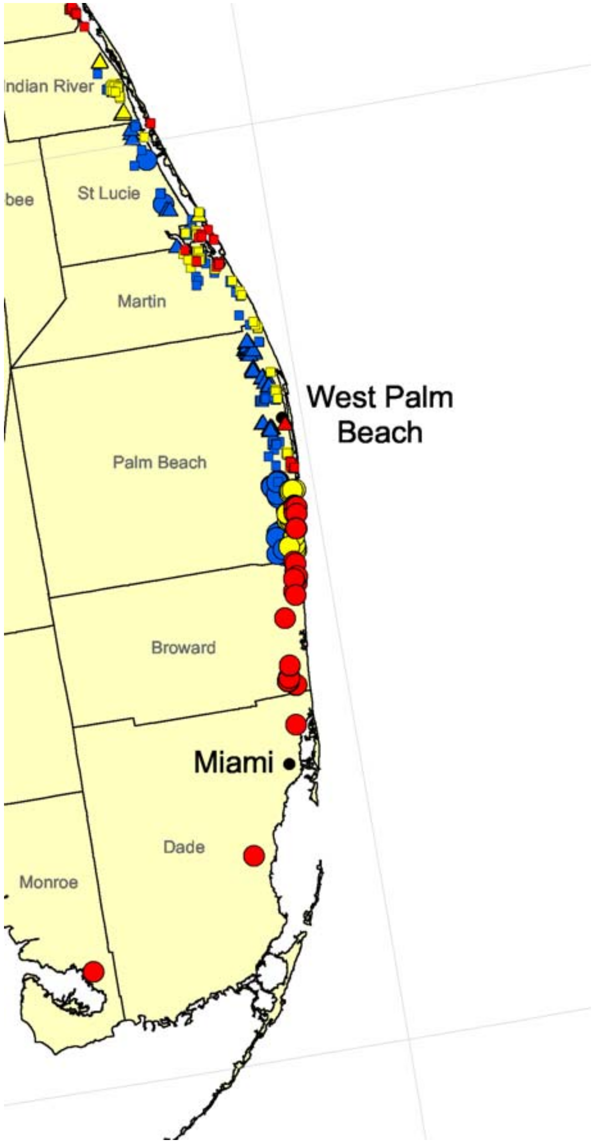
Washington
Jackson
Calhoun
Bay
Gulf
Libe
Pensacola

Miami – Palm Beach



Findings

- Key Findings
  - High vulnerability/ high reliance CWS concentrated in Pensacola and Miami-Palm Beach areas
  - Vulnerability index results appear to be consistent with known occurrences of salinity due to salt water intrusion
  - Index could be simplified (to drop some DRASTIC factors) and still provide valid results – M and P are most important
- Limitations
  - Applicability to confined aquifer systems
  - Utility when data availability is limited

Next Steps

- Identify decision makers best positioned to use this index
- Apply index to other states in Gulf Coast Region and Mid-Atlantic Region
- Develop risk management guidance based on the priority setting framework; identify decision points and actions (site-specific monitoring and risk assessment, long-term planning for alternate supplies, hydraulic controls)

Contact Information

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