

# *Design Ice Criteria*

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Bonneville Power Administration

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Calgary  
Towers, Poles & Conductors Meeting



# Design Ice Criteria - BPA

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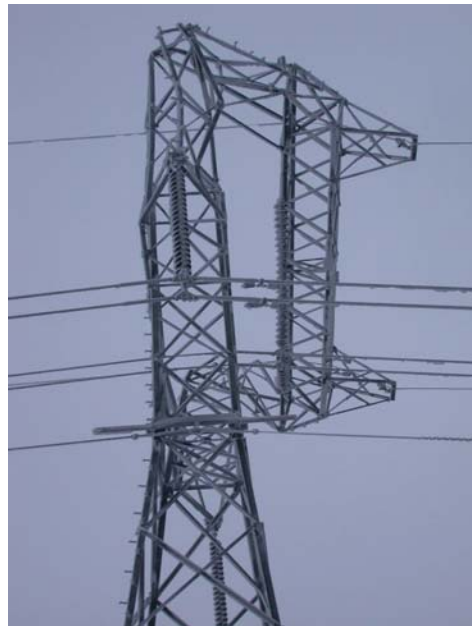
## Outline

- History
- Present State
- Future

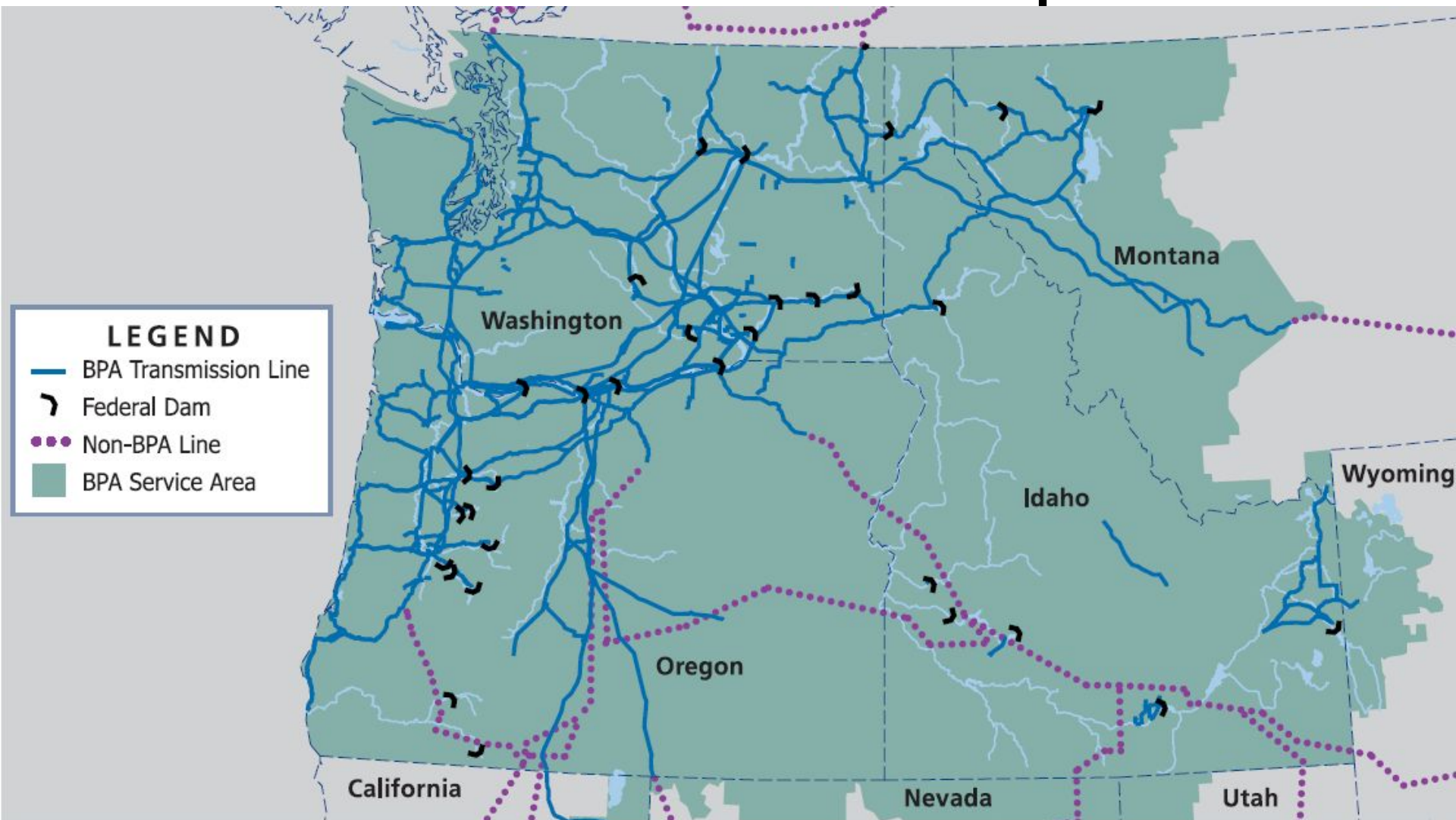
# Importance of Ice Criteria

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- Used in the design of towers, wires and hardware
- Avoid over-estimating and under-estimating
- NESC



# BPA Service Map



# NESC

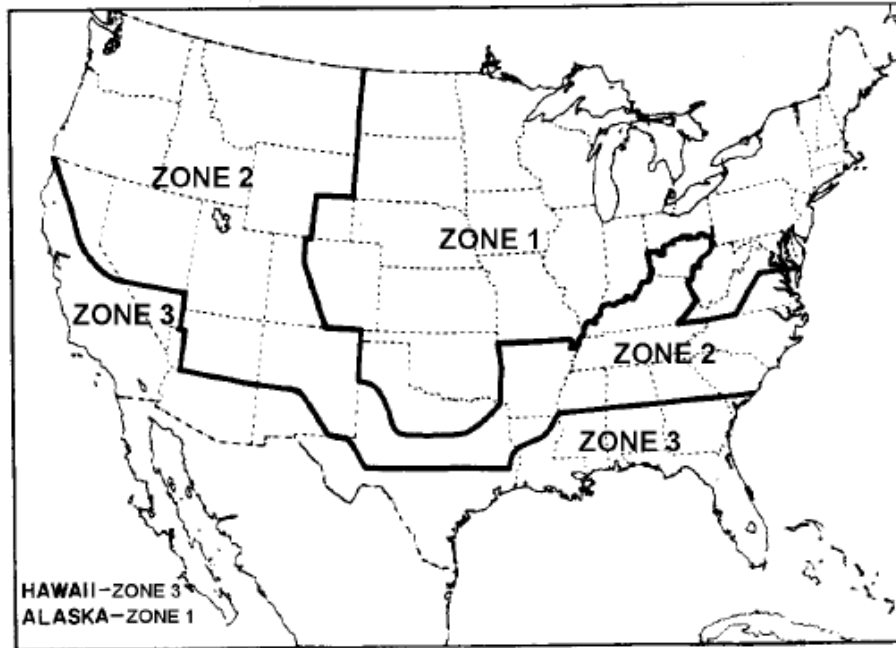


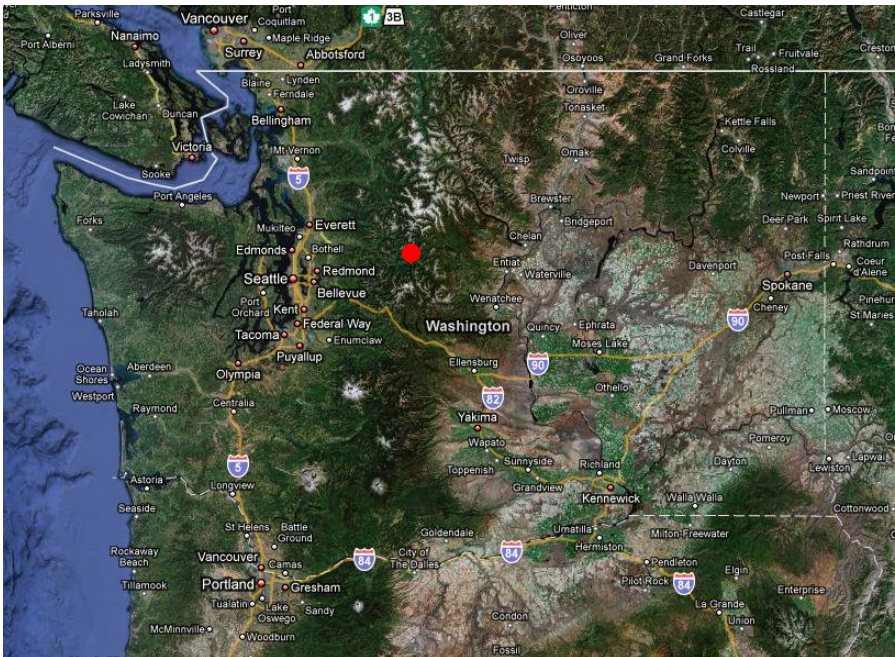
Figure 230-1—Clearance zone map of the United States

Table 230-1—Ice thickness for purposes of calculating clearances

	Clearance zone (for use with Rules 232, 233, 234, and 235)		
	Zone 1	Zone 2	Zone 3
Radial thickness of ice			
(mm)	12.5	6.5	0
(in)	0.50	0.25	0

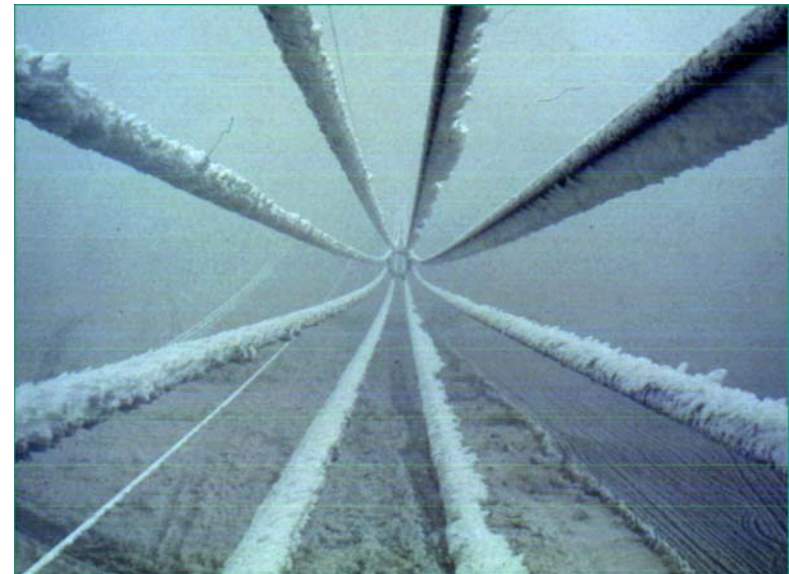
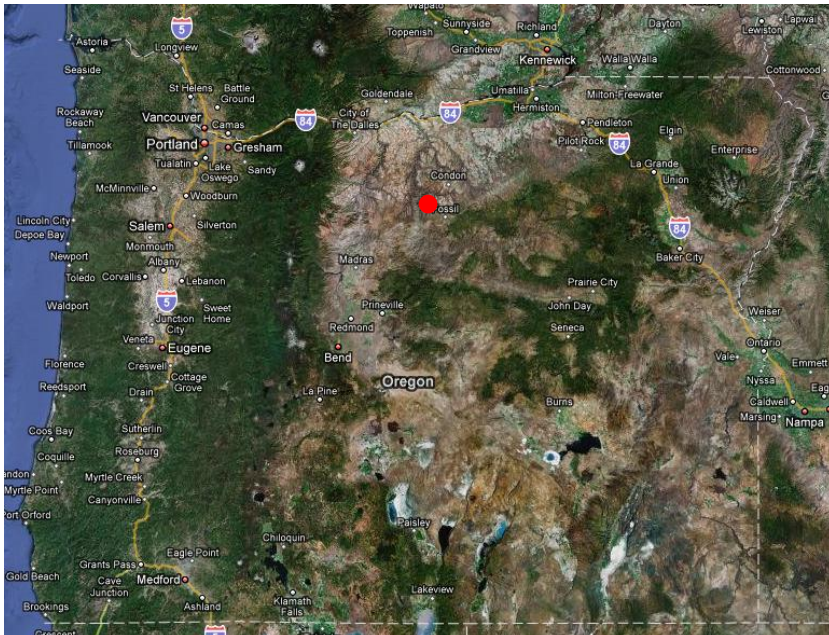
# History

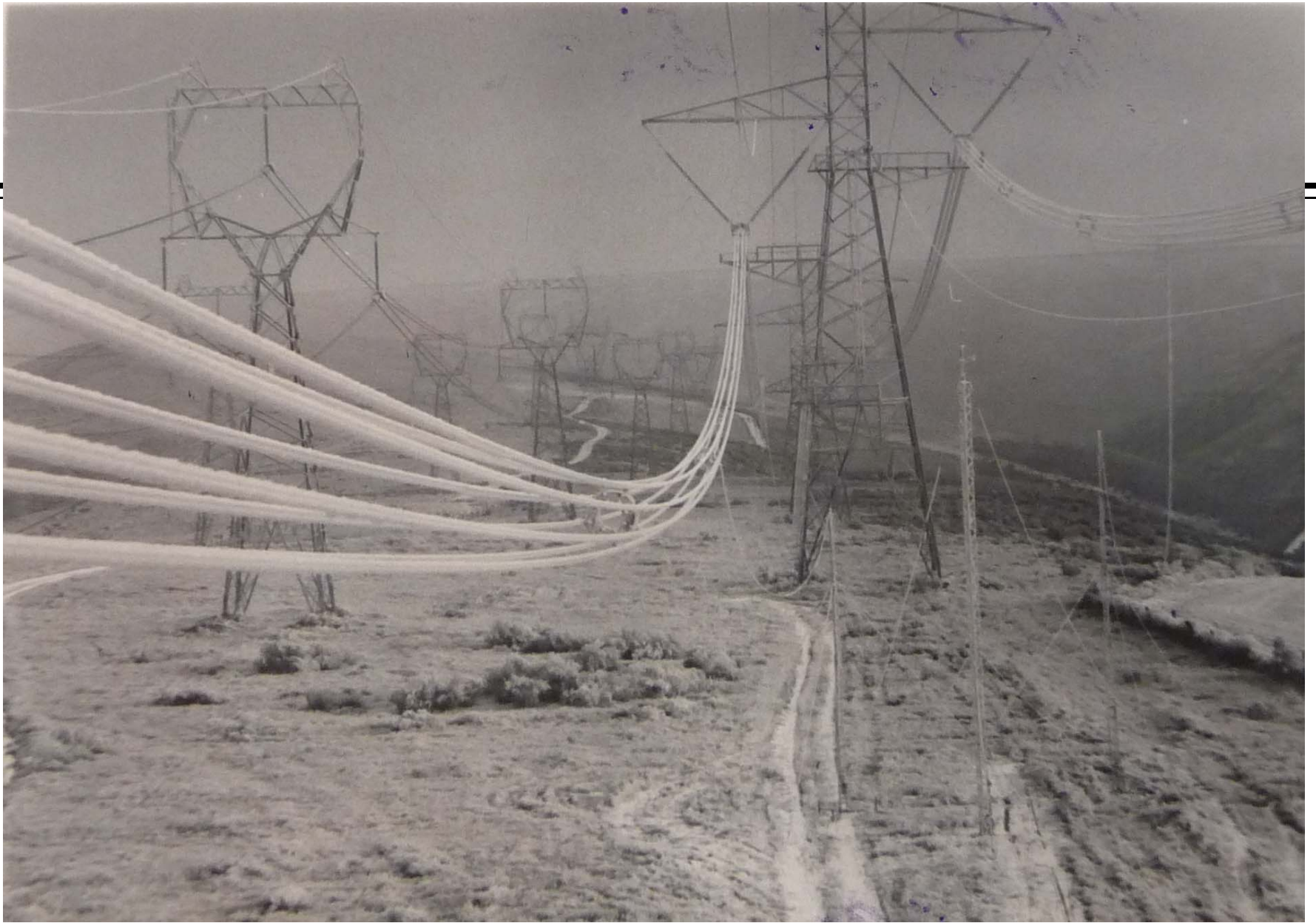
## Test Span at Stampede Pass 1952-1972



# History

- Ice Maps commissioned in 1976 and delivered in 1977
- New test spans in Moro, Oregon 1976-1997

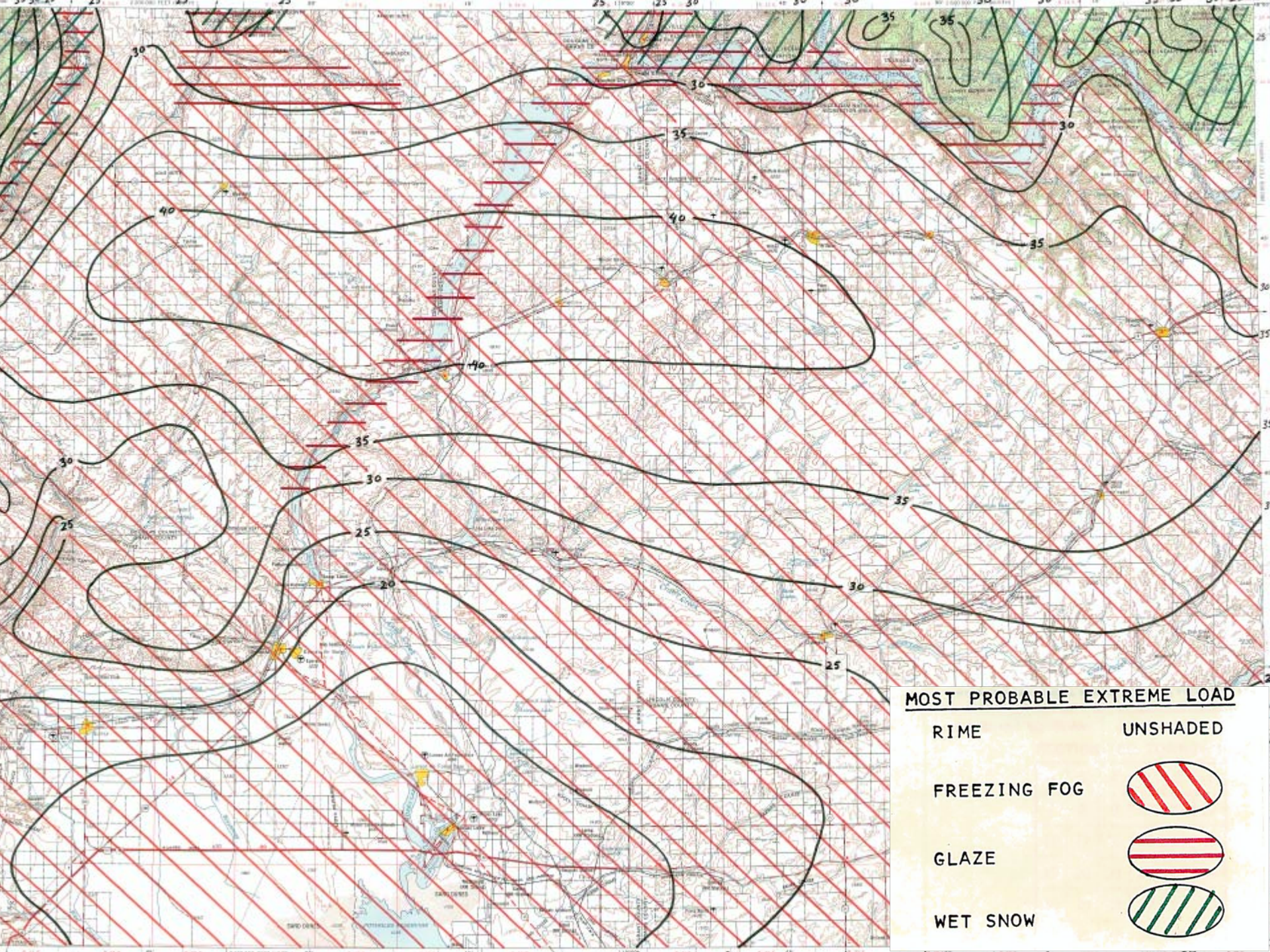







# Design Ice Criteria

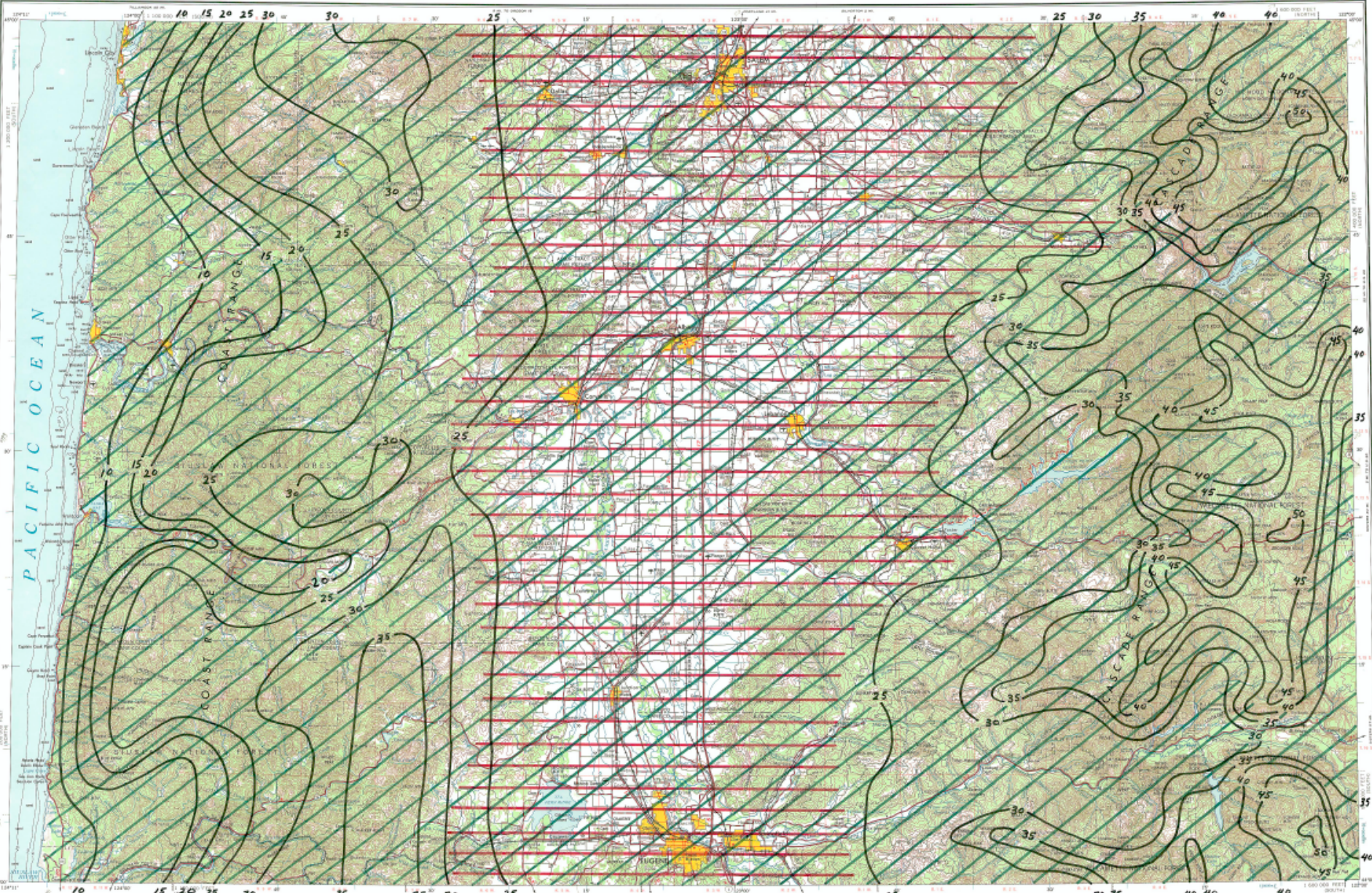
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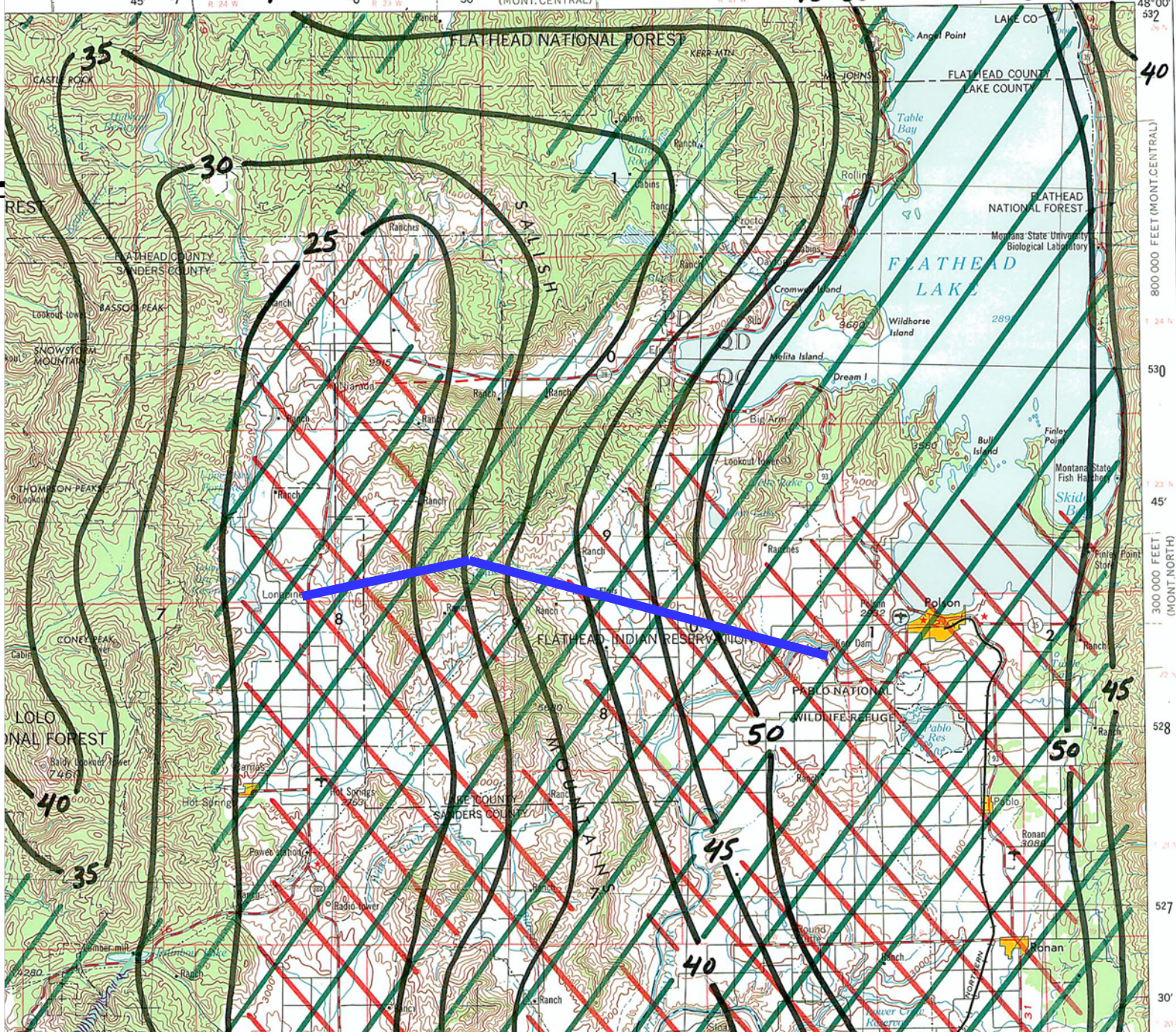
- BPA Memo 1982
  - Standard design minimum is ½” ice zone
  - Determine zone from Ice Maps
  - Increase design ice zone when Ice Maps indicate it is necessary
  - Use the 25-year recurrence interval map



**MOST PROBABLE EXTREME LOAD**

- |              |   |
|--------------|---|
| RIME         | UNSHADED  |
| FREEZING FOG |  |
| GLAZE        |  |
| WET SNOW     |  |





# Design Ice Criteria

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For a ½” Ice Zone:

- Working Loads: ½-8-0
- Ultimate Loads: ACSR wire not to exceed 75% of RS at 1-8-0
- Rime ice: 2R-4-0

# Where do we go from here?

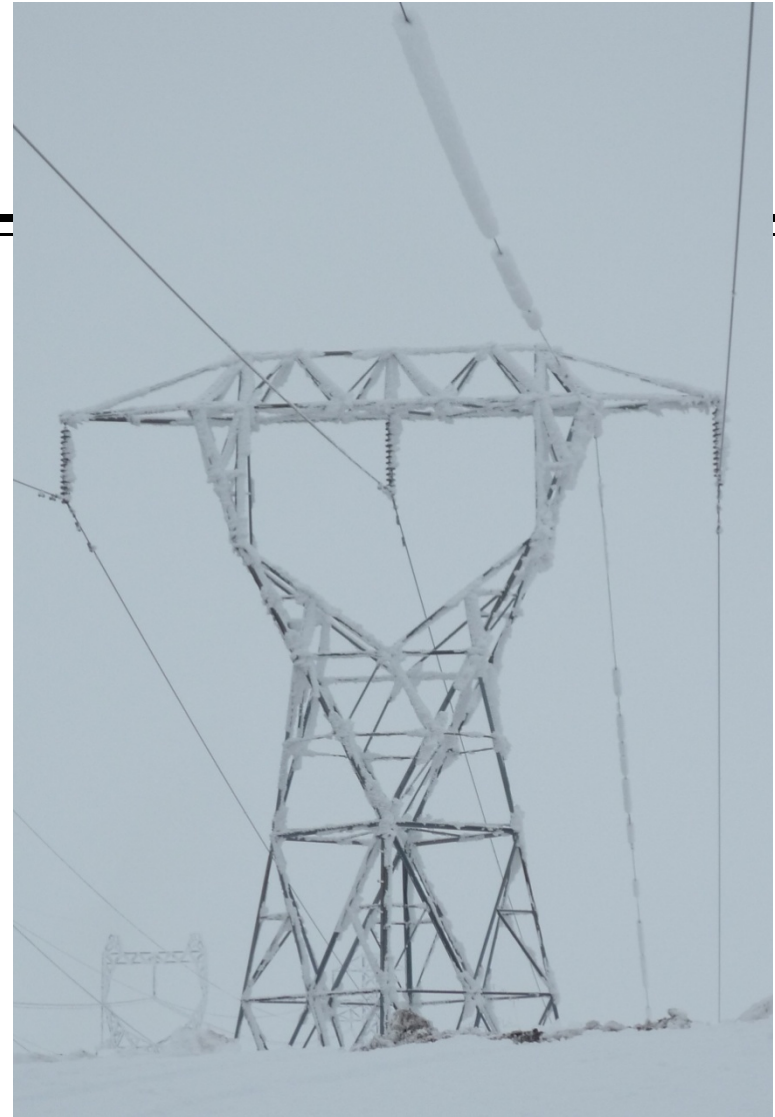
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- Update ice maps?
- Adjust design criteria based on experience?
- Research rime ice?

# Rime Ice



# Rime Ice



# Thank you!

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