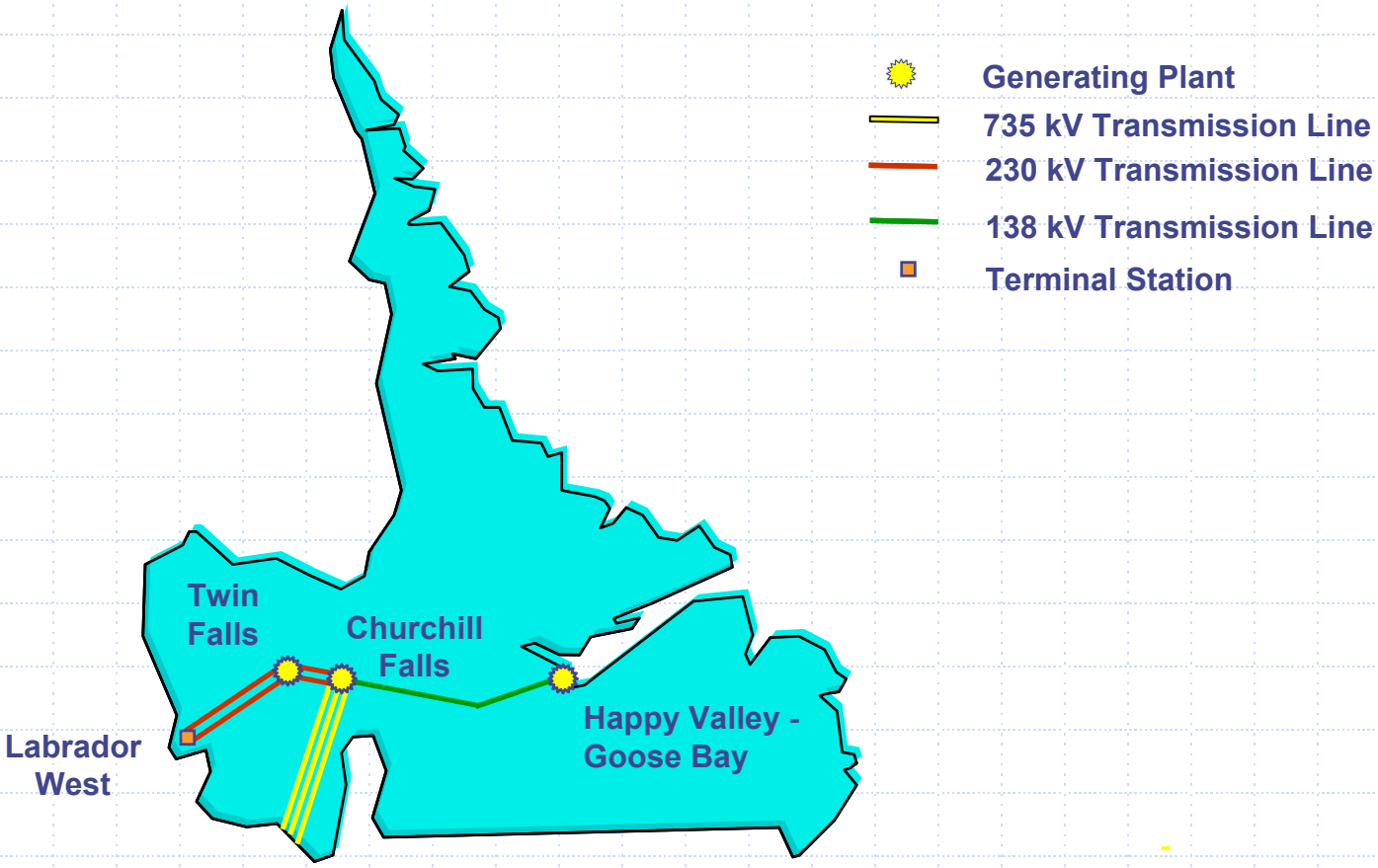
Transmission and Rural Operations

HYDRO
THE POWER OF COMMITMENT

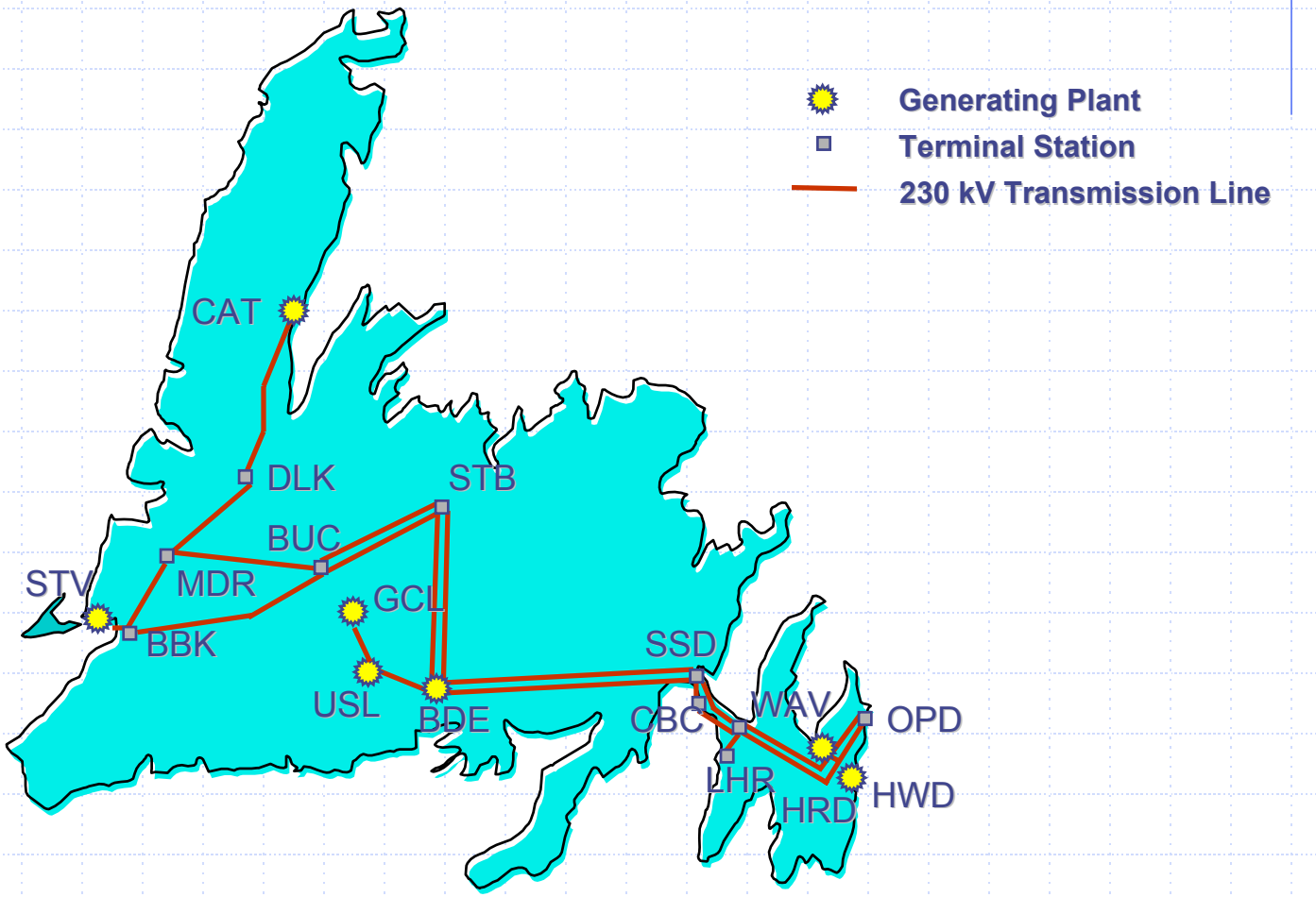
System Map


Generating Plant
735 kV Transmission Line
230 kV Transmission Line
138 kV Transmission Line
Terminal Station
Twin Falls
Churchill Falls
Labrador West
Happy Valley - Goose Bay

System Map

Distances

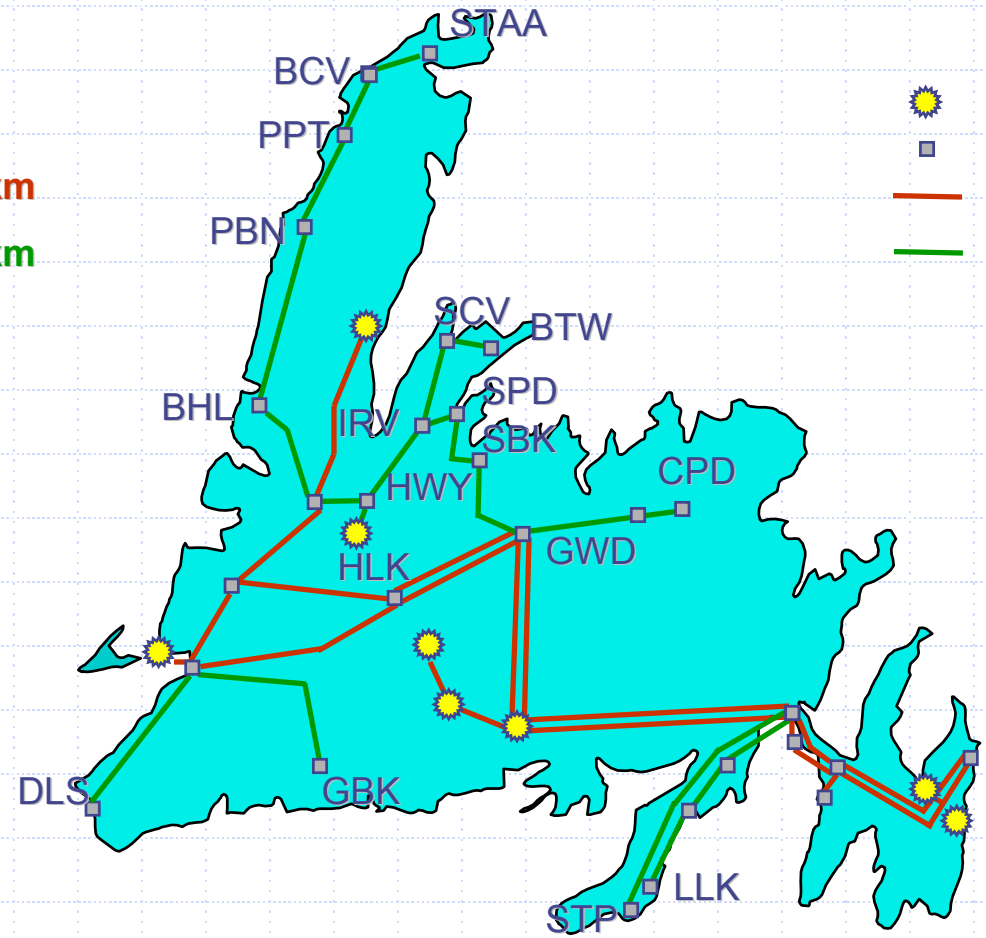
230 kV 1500 km



System Map

Distances

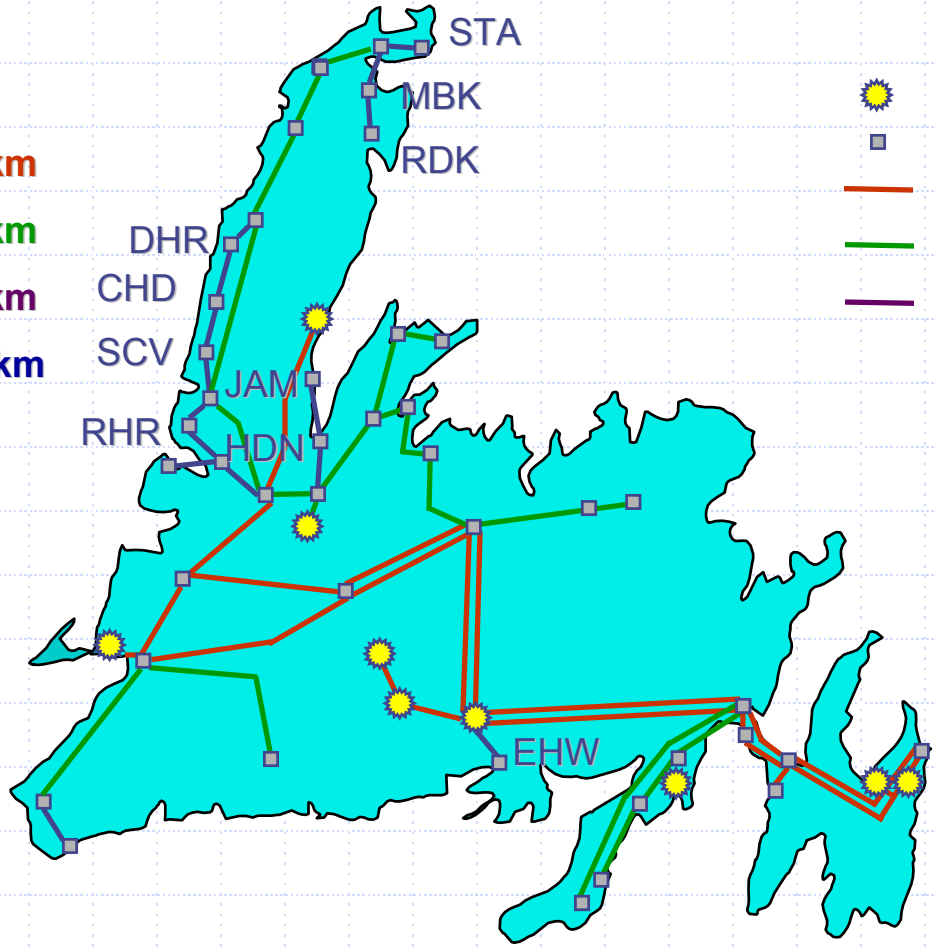
230 kV	1500 km
138 kV	1500 km



- Generating Plant
- Terminal Station
- 230 kV Transmission Line
- 138 kV Transmission Line

System Map

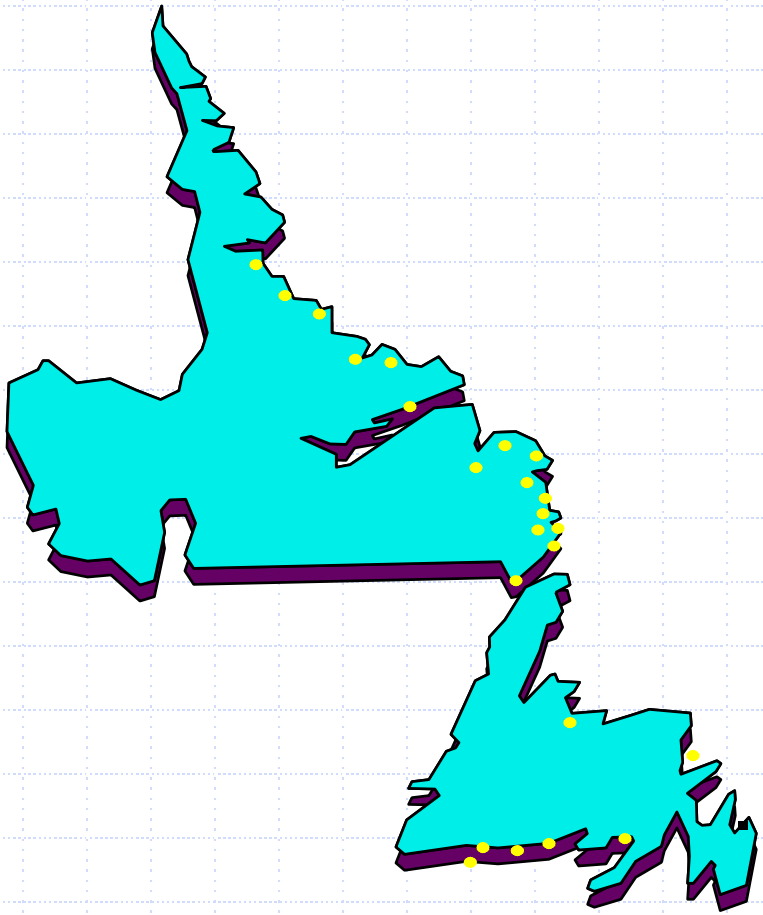
Distances	
230 kV	1500 km
138 kV	1500 km
69 kV	700 km
Distribution	3000 km



- Generating Plant
- Terminal Station
- 230 kV Transmission Line
- 138 kV Transmission Line
- 69 kV Transmission Line

Isolated Diesel Plants

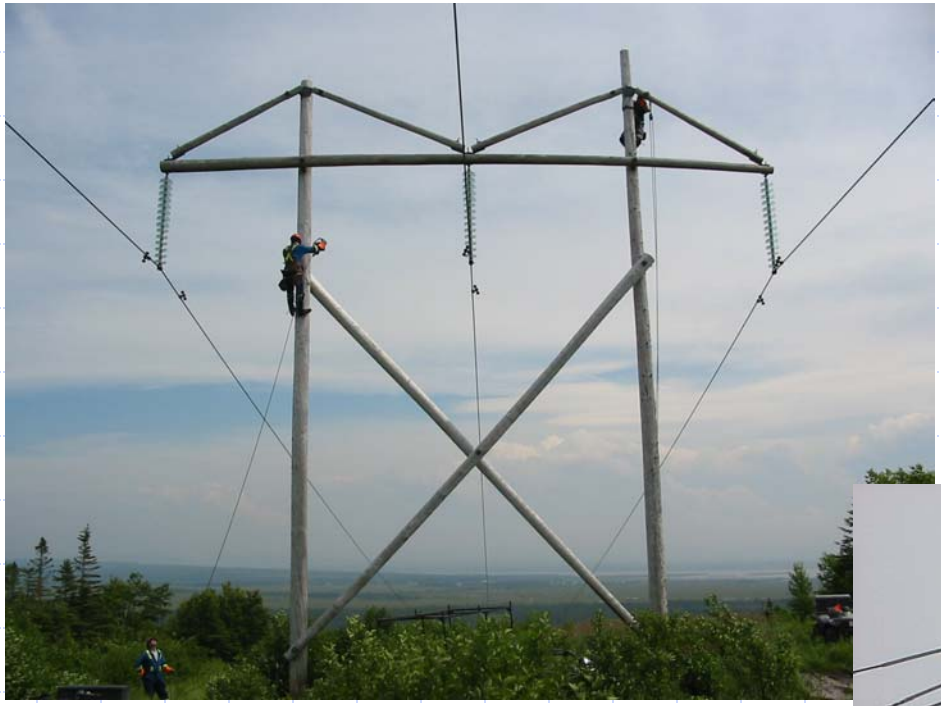
Black Tickle
Cartwright
Charlottetown
Davis Inlet
Hopedale
L'Anse au Loup
Makkovik
Mary's Harbour
Nain
Norman Bay
Paradise River
Port Hope Simpson
Postville
Rigolet
St. Lewis
Williams Harbour



Diesel Plant

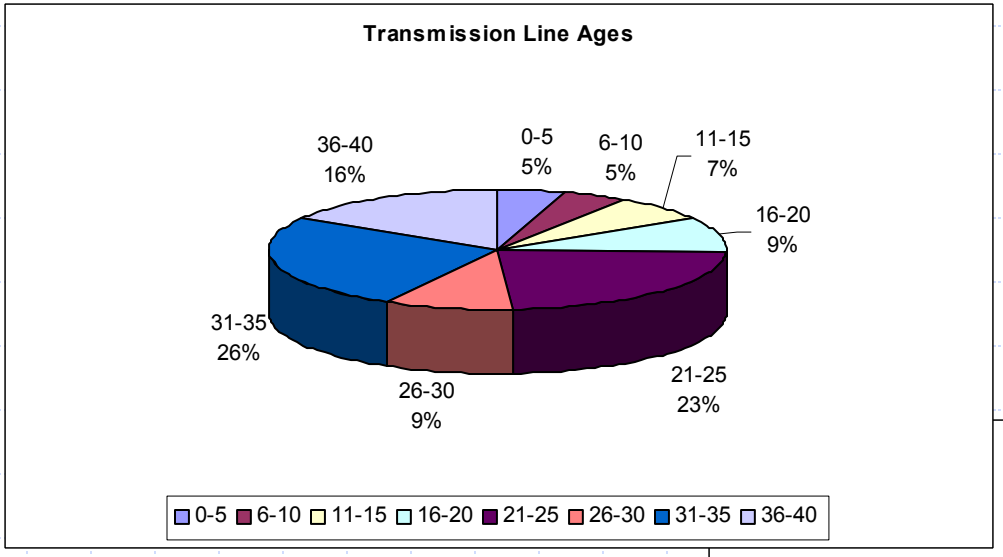
Francois
Grey River
Little Bay Islands
McCallum
Ramea
Rencontre East
St Brendan's

Wood Pole Line Management Program



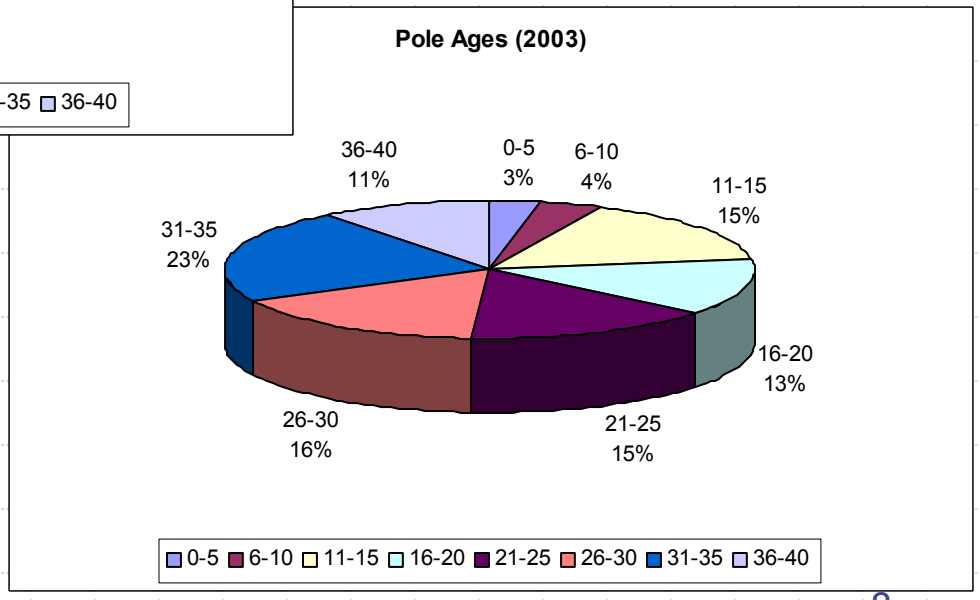
HYDRO
THE POWER OF COMMITMENT

Transmission Line and Pole Age Data



Wood Pole Lines

- 43 lines
- 2500 km
- 26,000 poles



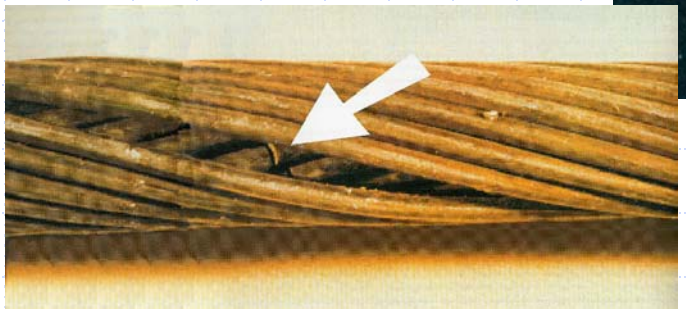
Historical Maintenance Practices

- Time Based program primarily visual in nature
- Helicopter Patrols – Typically 4 times per year
- Climbing Inspections – 5 year interval (20% per line per year)
- Snowmobile Patrols – only in the winter months

Previous Pole Inspections

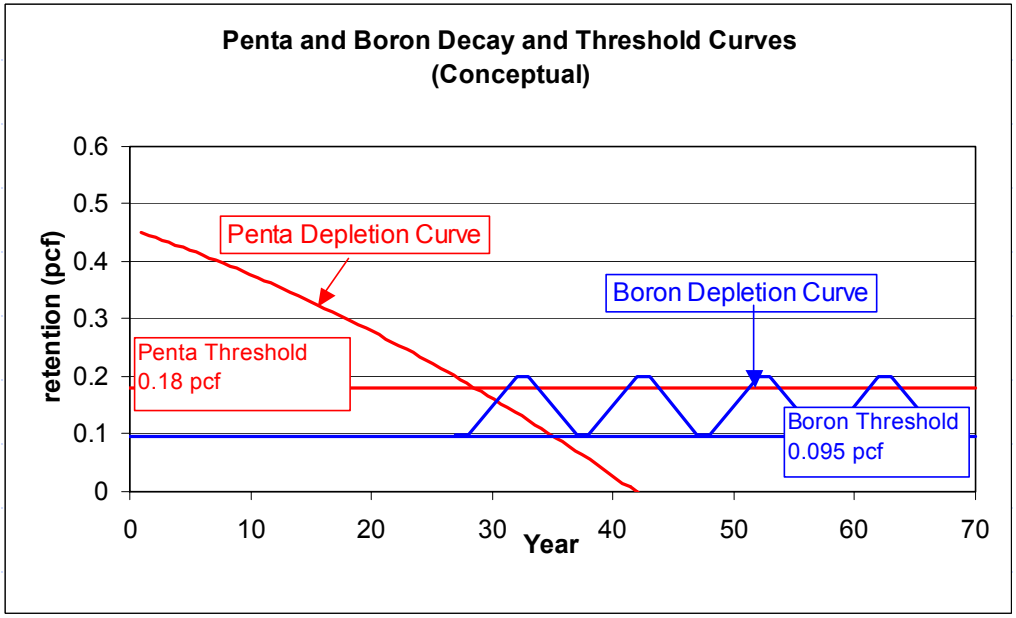
Region	Year	Poles Inspected	Pole Rejections	Replacement Cost
Avalon	1985	1270	0	None required
Avalon	1998	1500	79	$600,000
Central	2000	1500	82	$420,000
TL 220	2002	273	27	Currently under analysis
Island Wide	2003	1943	133	Currently under analysis

Inspection Results



Inspection Results

- Preservative Retention Levels
  - 1985 – very small percentage below effective level (Avalon Peninsula)
  - 1998 – 48% below effective level (Avalon Peninsula)



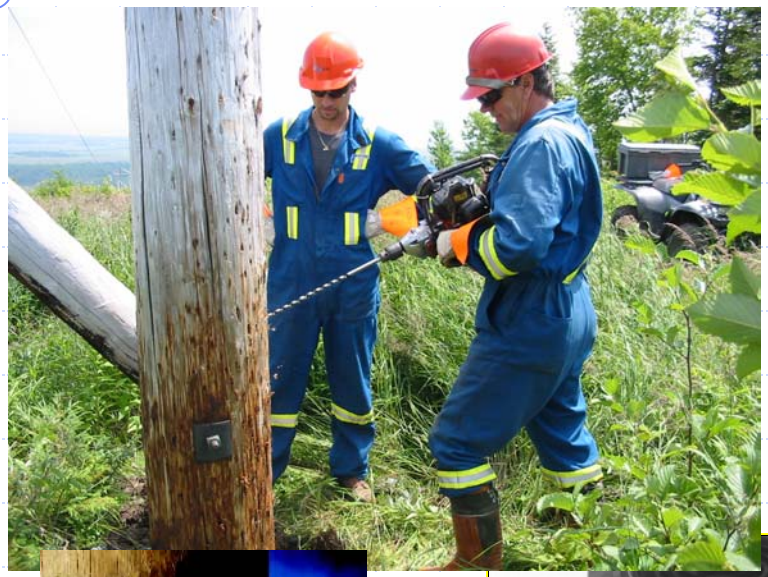
Inspection Results

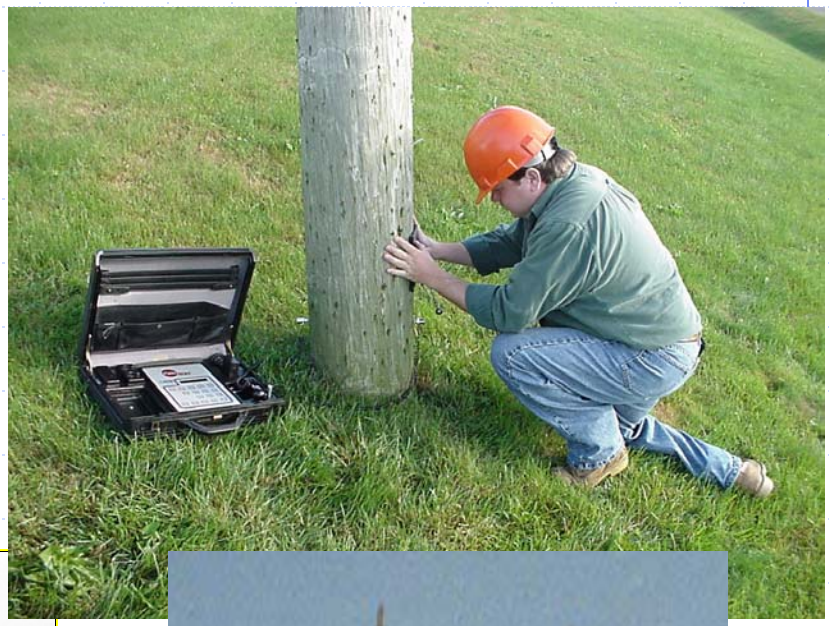
- Wood Pole Strength
  - Full scale tests show 35 year old poles have lost approximately 25% of their original strength

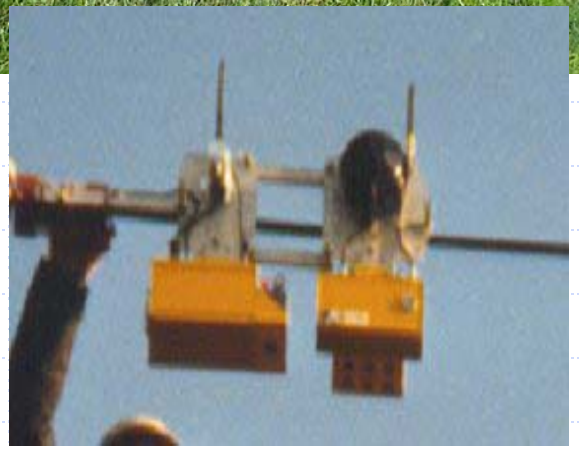
Improved Wood Pole Line Management Program

- Variable 10-year inspection cycle – condition based
- Schedule revised annually based on results
- Improved inspection techniques
- Includes external and internal inspection (sounding/ boring), treatment and non-destructive evaluation (NDE)
- Analysis of data prior to replacement
- Establish a Transmission Asset database
- Effective coordination of line maintenance

New Inspection Techniques







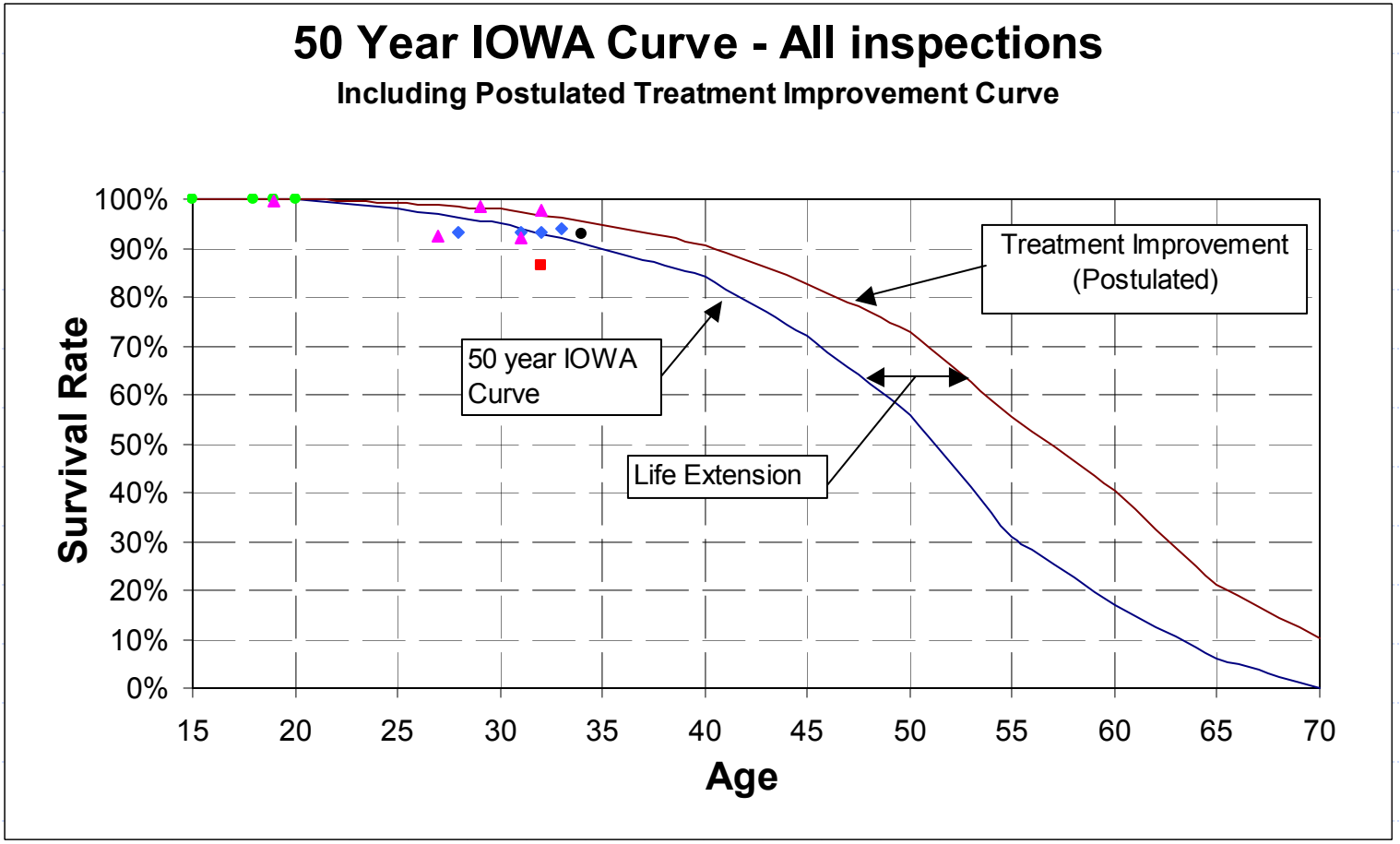
Program Objectives

- 4000 poles inspected per year, decreasing to 1600 by the end of the first 10-year cycle
- All poles inspected and NDE tested
- Poles over 20 years old will be treated
- 10% cored for preservative retention analysis

Program Objectives (cont'd)

- Rejection rate based on condition and structural analysis
- Rejected equipment to be replaced in subsequent year
- Annual Public Utilities Board update on results and effectiveness of the program

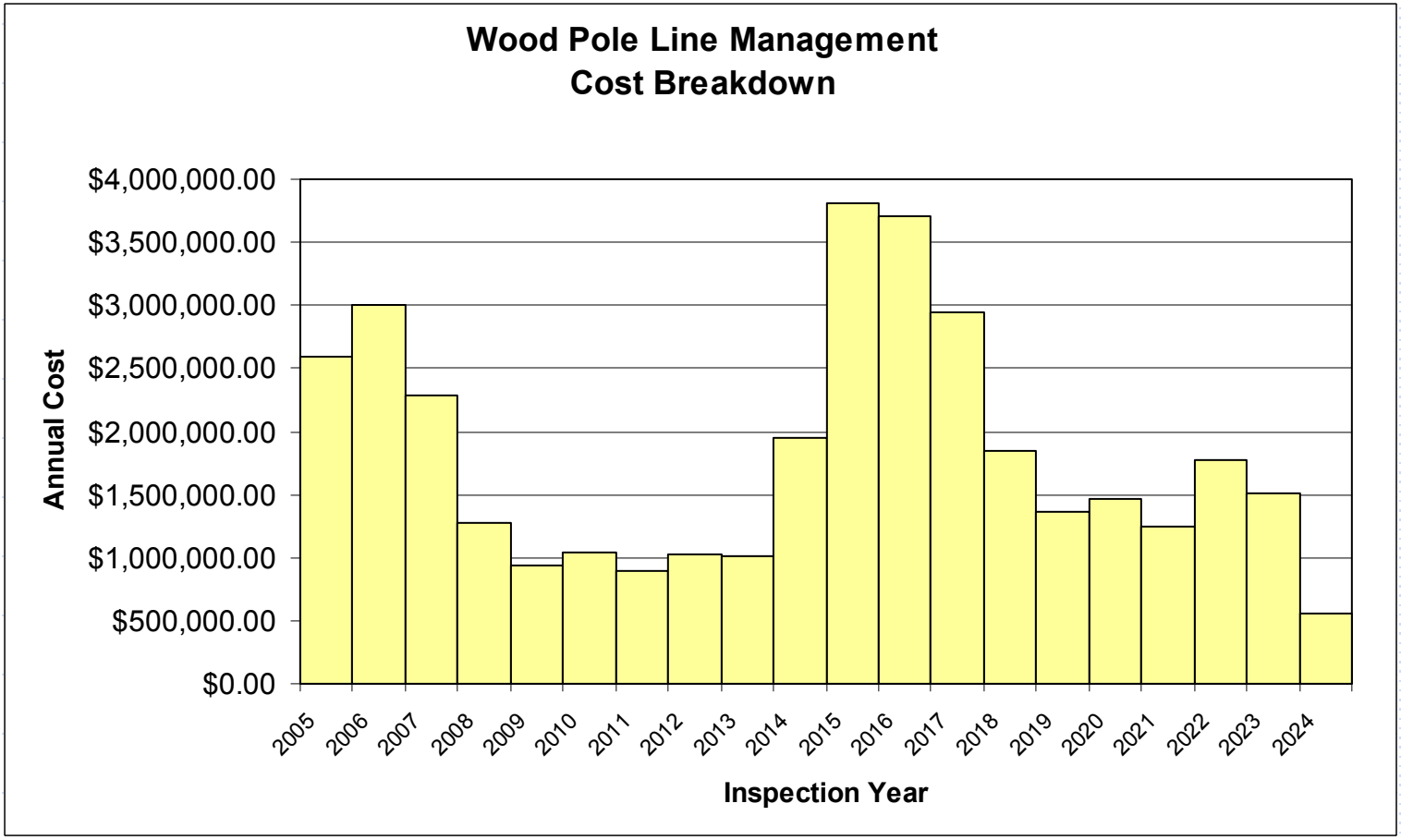
Iowa Curve


50 Year IOWA Curve - All inspections
Including Postulated Treatment Improvement Curve
Survival Rate
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
15
20
25
30
35
40
45
50
55
60
65
70
Age
Treatment Improvement (Postulated)
50 year IOWA Curve
Life Extension

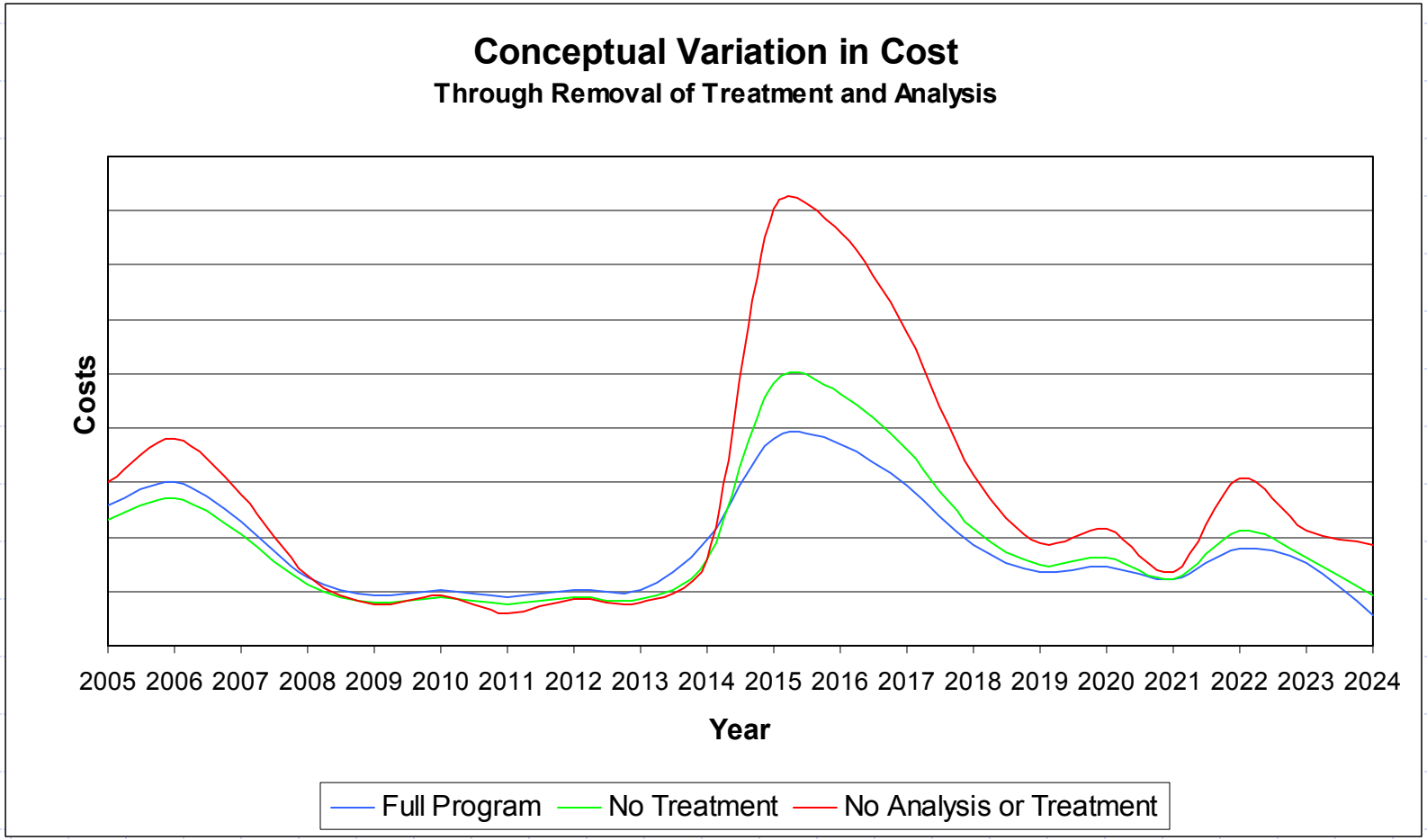
Estimated Program Costs

- Cost benefit analysis provides an anticipated savings of $4.5M over the next 20 years due to treatment application only
- Required Budget of $36M over next 20 years

Estimated Program Costs



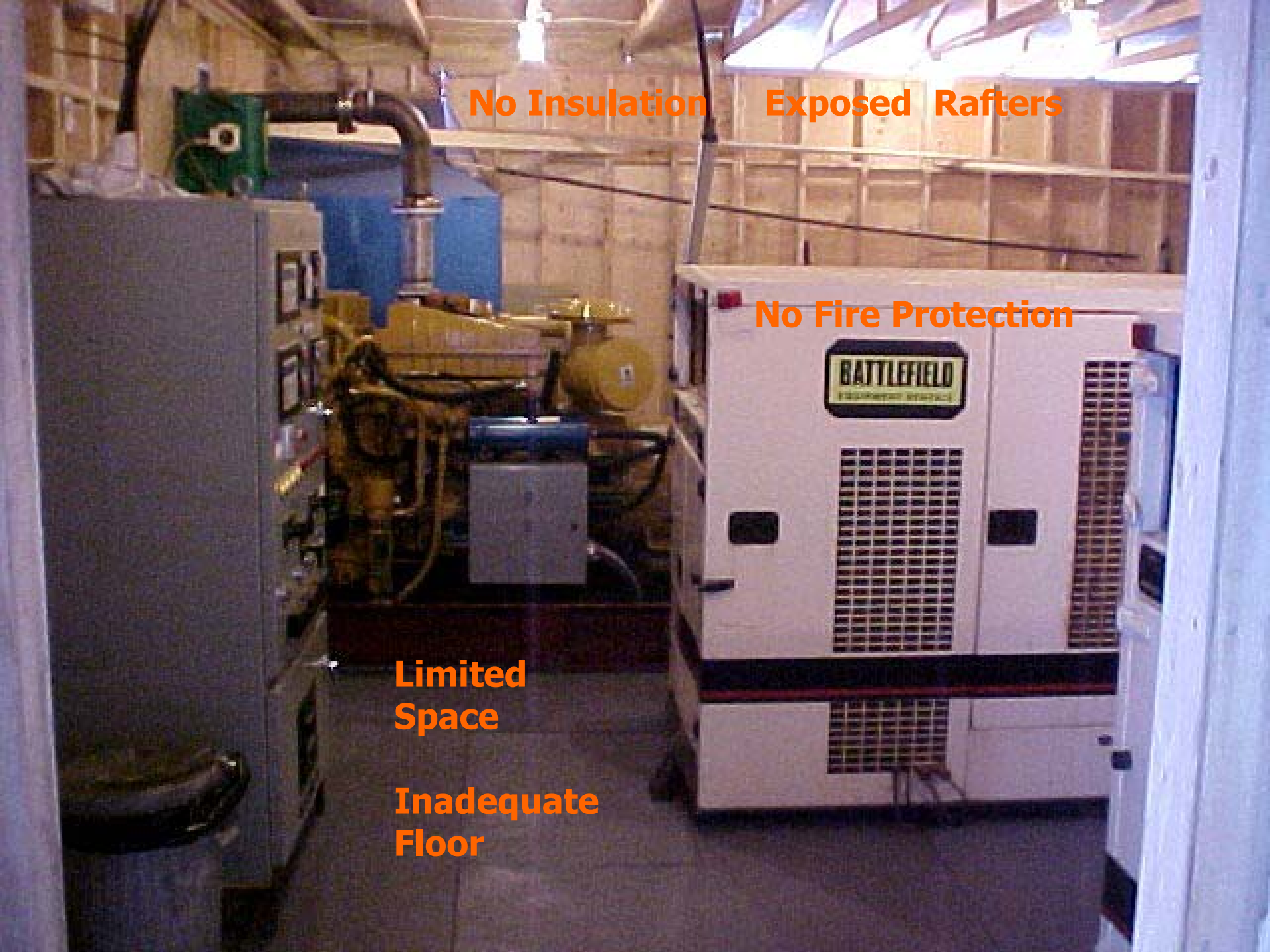
Conceptual Cost Variance



Conclusions

- Assist in long-term planning of the high voltage transmission network
- Provide a more reliable transmission system
- Extend transmission line life by a minimum of 10 years
- Result in significant cost savings to the ratepayers

Rencontre East


No Insulation
Exposed Rafters
No Fire Protection
BATTLEFIELD
Limited Space
Inadequate Floor


Inadequate Stack Height
Units protrude trough the end of the building