

Wood Pole Survivor Rates by Decay Hazard Zone Initial Inspection vs. Recycle Inspection

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In 1999 Osmose compiled data on 751,000 utility poles commercially inspected and treated by its inspectors for various utilities across the United States between 1988 and 1999. The data was selected to show the results that a typical pole owner can expect from an inspection and treatment program.

The data was sorted into several groups for statistical analysis. First it was sorted into the 5 decay hazard zones as geographically defined in AWWA standard C-4-99. The data from each zone was further separated into 2 groups of poles; one containing poles that were part of an initial inspection and treatment program and the other, containing poles that were a part of a subsequent or recycle inspection program. All poles were included for reporting purposes whether they were fully excavated and groundline treated, partially excavated and selectively treated, sound and bore inspected and fumigant treated, or visually inspected only. The intent was to accurately report the condition of the entire pole plant.

The data was then further sorted into 5-year age bands and queried to identify poles that were either rejected or serviceable with decay. This information is summarized in Table 1 "Recycle Statistics by Decay Hazard Zone". The statistics show that when properly inspected and treated with a combination of effective remedial treatments that target specific decay patterns (i.e. internal decay, external decay and internal voids), reject rates and decay rates can be lowered dramatically on subsequent inspection cycles. The data also show that, in most cases, as the length of time between inspection and treatment cycles increases, reject rates and decayed serviceable rates increase as well.

Using the 5-year age data, survivor curves for both the initial and recycle inspections were plotted by decay hazard zone in tables 2-6. Predicted service life was also calculated for the 5 decay hazard zones utilizing this data for both the initial and subsequent inspections. It should be noted that the predicted service life is the point at which 50% of the sample has failed. This information is summarized in Table 7 "Predicted Service Life". True survivor rates would be somewhat lower than those reported here because it is virtually impossible to determine how many poles were replaced prior to these inspections due to deterioration, traffic damage or weather damage. The data shows that predicted service life is greatly increased after one inspection and treatment cycle.

In summary, this data clearly shows that wood pole service life can be greatly increased by combining the proper application of effective remedial treatments with a pole inspection program.



Table 1

Recycle Statistics By Decay Hazard Zone

	Zone 1 Reject %	Zone 1 Decay %	Zone 2 Reject %	Zone 2 Decay %	Zone 3 Reject %	Zone 3 Decay %	Zone 4 Reject %	Zone 4 Decay %	Zone 5 Reject %	Zone 5 Decay %
Initial inspection	6.1	11.5	8.8	29.7	10.1	22.9	11	19.5	11.4	20.5
Osmose Recycle <u>inspection</u> Total group	1.1	3.7	2.7	8.2	1.8	22.8	1.6	5.4	2	10.2
Initial only	0.7	0.9	2.5	3.6	1.3	21.3	1.3	3.2	1.3	8.2
Recycle only										
6-9 yrs*	1.3	3.8	2.4	10.6	2.1	14.8	1	6.1	0.8	3.6
10-12 yrs*	1.6	5.5	2.9	11.4	1.8	14.3	2.8	8.6	4	10.7
13-15 yrs*	1	3.4	3.2	10.3	2.9	31.6	3.2	10.9	4.2	21.2
Average recycle	1.4	4.7	2.8	10.9	2.5	24.9	1.8	7.5	2.9	12.4

* Time elapsed since previous inspection

# poles in sample	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
Initial inspection	81,986	84,300	95,025	101,012	101,937	464,260
Recycle inspection	20,182	58,590	46,515	101,910	59,702	286,899
						751,159

Table 2
Decay Hazard Zone 1
Initial vs. Recycle Inspection

Initial Inspection

Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%
5	100.0%	0.0%	0.0%
10	99.9%	0.1%	0.1%
15	99.6%	0.3%	0.4%
20	99.0%	0.6%	1.0%
25	96.9%	2.1%	3.1%
30	93.8%	3.2%	6.2%
35	89.7%	4.4%	10.3%
40	83.8%	6.6%	16.2%
45	69.7%	16.8%	30.3%
50	49.2%	29.4%	50.8%
51+	44.5%	9.5%	55.5%

Recycle Inspection

Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%
5	100.0%	0.0%	0.0%
10	99.9%	0.1%	0.1%
15	99.8%	0.1%	0.2%
20	99.6%	0.2%	0.4%
25	99.4%	0.2%	0.6%
30	98.6%	0.8%	1.4%
35	97.9%	0.7%	2.1%
40	96.4%	1.5%	3.6%
45	94.4%	2.1%	5.6%
50	91.9%	2.7%	8.1%
51+	88.4%	3.8%	11.6%

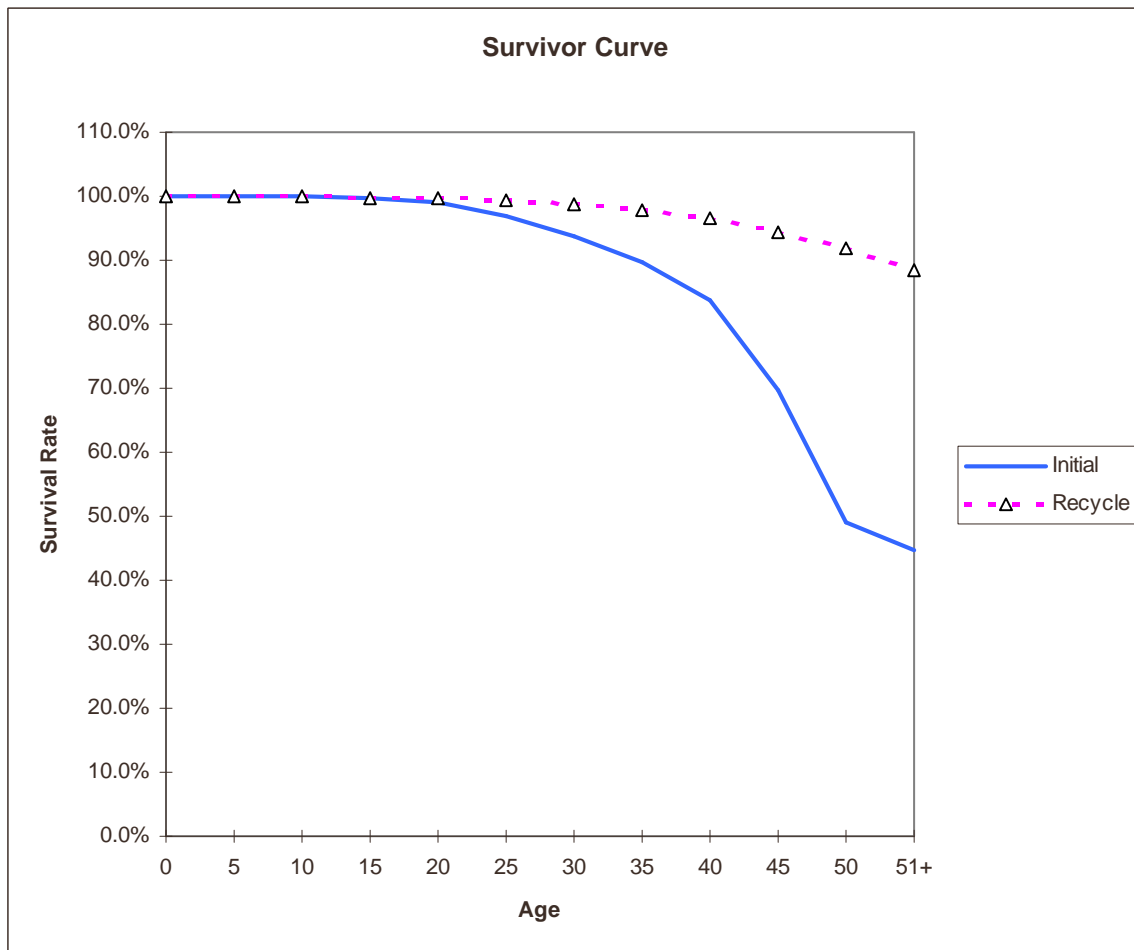


Table 3
Decay Hazard Zone 2
Initial vs. Recycle Inspection

Initial Inspection				Recycle Inspection			
Age	Survival Rate	Reject Rate	Cumulative Reject Rate	Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%	0	100.0%	0.0%	0.0%
20	99.7%	0.3%	0.3%	20	99.8%	0.2%	0.2%
25	98.5%	1.2%	1.5%	25	99.0%	0.8%	1.0%
30	96.4%	2.1%	3.6%	30	98.2%	0.8%	1.8%
35	91.8%	4.8%	8.2%	35	97.0%	1.2%	3.0%
40	84.9%	7.5%	15.1%	40	95.3%	1.8%	4.7%
45	75.7%	10.9%	24.3%	45	93.7%	1.7%	6.3%
50	65.4%	13.5%	34.6%	50	89.4%	4.6%	10.6%
55	53.8%	17.8%	46.2%	55	83.8%	6.2%	16.2%
60	43.6%	18.9%	56.4%	60	78.1%	6.8%	21.9%
65	35.2%	19.3%	64.8%	65	72.6%	7.0%	27.4%
66+	30.1%	14.4%	69.9%	66+	69.1%	4.9%	30.9%

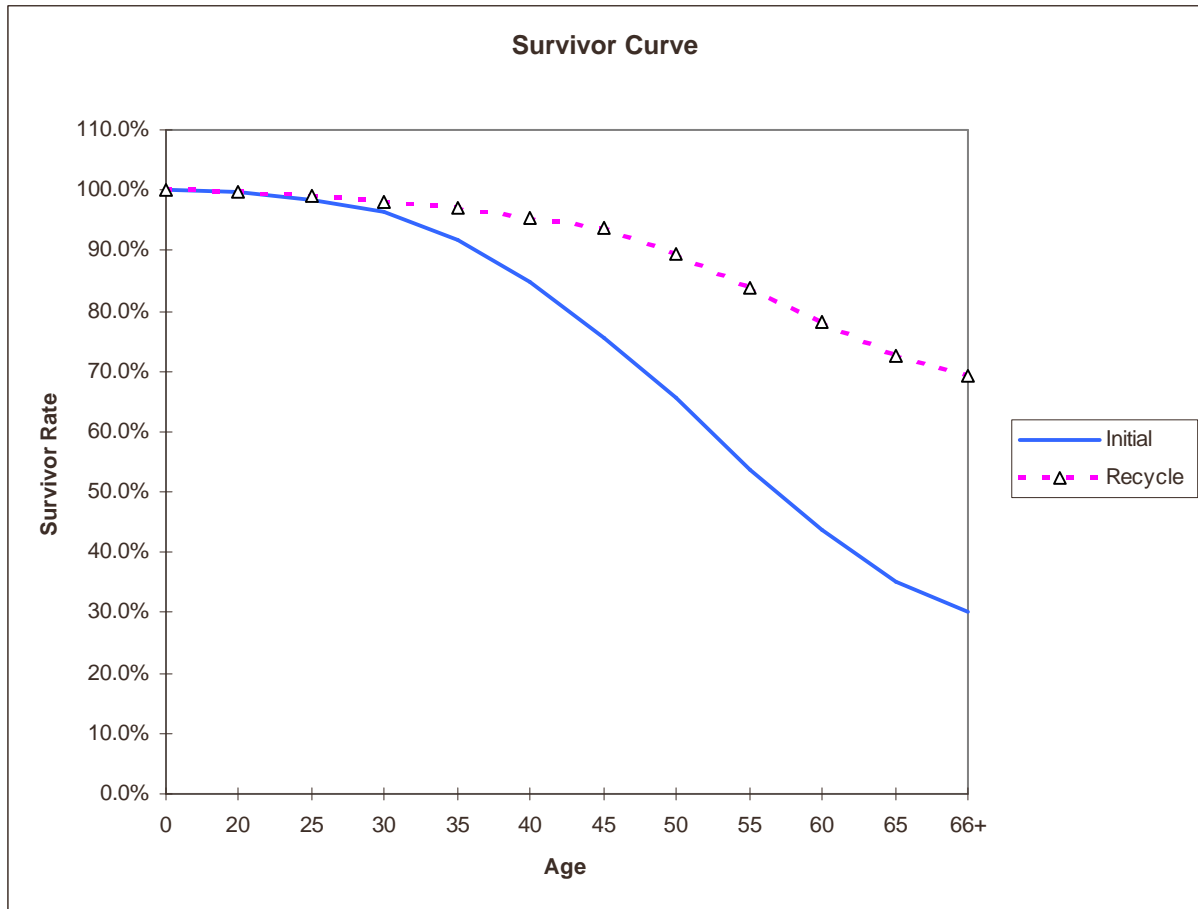


Table 4
Decay Hazard Zone 3
Initial vs. Recycle Inspection

Initial Inspection			
Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%
5	99.9%	0.1%	0.1%
10	99.8%	0.2%	0.5%
15	99.5%	0.3%	0.5%
20	96.3%	3.2%	3.7%
25	92.5%	4.0%	7.5%
30	86.0%	7.0%	14.0%
35	74.8%	13.0%	25.2%
40	62.5%	16.5%	37.5%
45	48.7%	22.1%	51.3%
50	37.4%	23.1%	52.6%
51+	31.9%	14.8%	68.1%

Recycle Inspection			
Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%
5	99.9%	0.1%	0.1%
10	99.9%	0.1%	0.2%
15	99.6%	0.3%	0.4%
20	98.8%	0.8%	1.2%
25	97.5%	1.3%	2.5%
30	96.3%	1.2%	3.7%
35	94.5%	1.9%	5.5%
40	90.0%	4.8%	10.0%
45	86.2%	4.2%	13.8%
50	80.9%	6.2%	19.1%
51+	77.2%	4.5%	22.8%



**Table 5
Decay Hazard Zone 4
Initial vs. Recycle Inspection**

Initial Inspection

Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%
5	100.0%	0.0%	0.0%
10	100.0%	0.0%	0.0%
15	99.7%	0.3%	0.3%
20	97.0%	2.7%	3.0%
25	88.3%	9.0%	11.7%
30	78.7%	10.9%	21.3%
35	68.2%	13.3%	31.8%
40	56.9%	16.6%	43.1%
45	45.2%	20.6%	54.8%
50	33.6%	25.5%	66.4%
51+	28.7%	14.6%	71.3%

Recycle Inspection

Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%
5	100.0%	0.0%	0.0%
10	99.7%	0.3%	0.3%
15	98.8%	0.9%	1.2%
20	97.3%	1.5%	2.7%
25	94.7%	2.7%	5.3%
30	91.9%	2.9%	8.1%
35	89.1%	3.1%	10.9%
40	85.7%	3.8%	14.3%
45	85.0%	0.8%	15.0%
50	84.4%	0.7%	15.6%
51+	81.0%	4.1%	19.0%

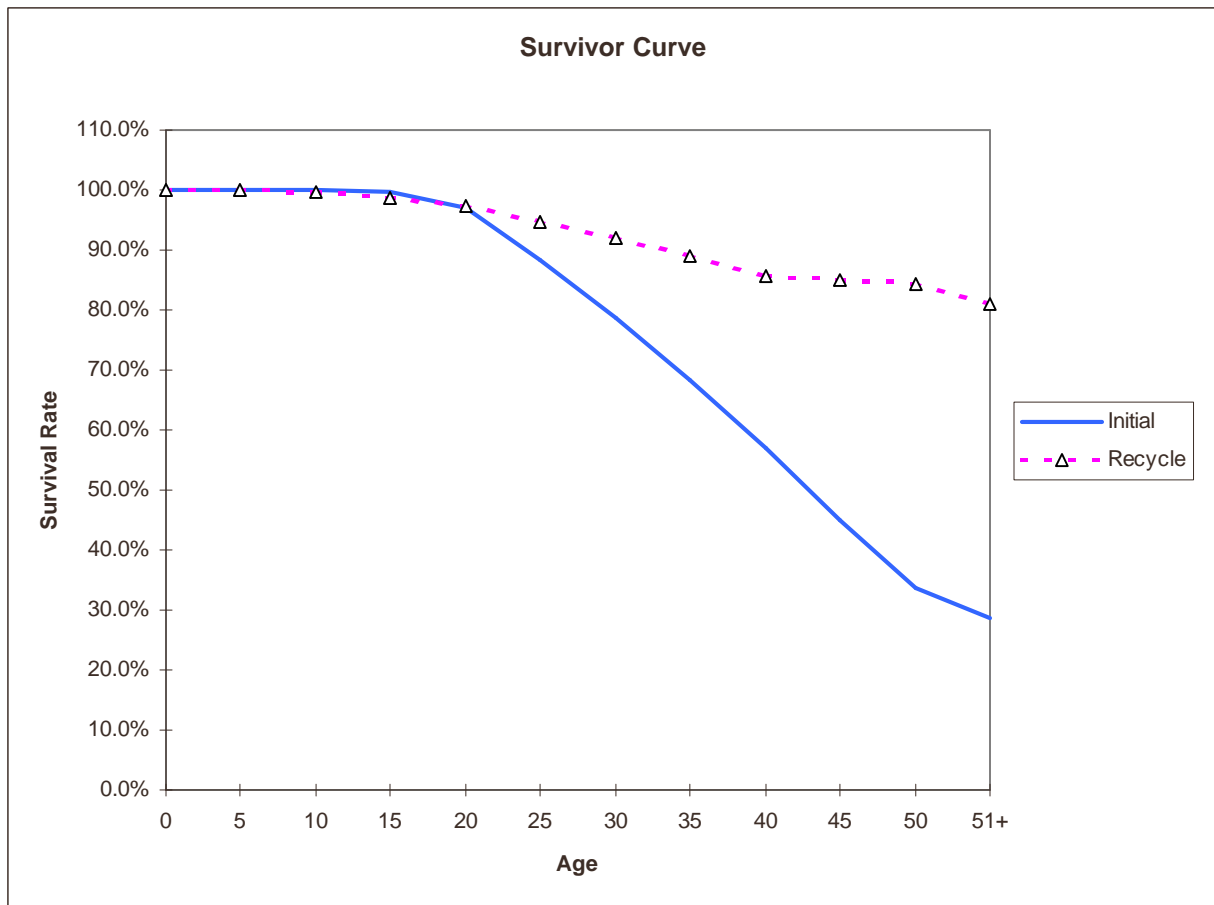


Table 6
Decay Hazard Zone 5
Initial vs. Recycle Inspection

Initial Inspection			
Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%
5	100.0%	0.0%	0.0%
10	100.0%	0.0%	0.0%
15	100.0%	0.0%	0.0%
20	99.2%	0.8%	0.8%
25	97.2%	2.0%	2.8%
30	91.4%	6.0%	8.6%
35	77.3%	15.4%	22.7%
40	51.2%	33.8%	48.8%
45	30.2%	40.9%	69.8%
50	19.1%	36.8%	80.9%
51+	16.7%	12.5%	83.3%

Recycle Inspection			
Age	Survival Rate	Reject Rate	Cumulative Reject Rate
0	100.0%	0.0%	0.0%
5	100.0%	0.0%	0.0%
10	99.6%	0.4%	0.4%
15	98.8%	0.8%	1.2%
20	98.1%	0.7%	1.9%
25	96.2%	1.9%	3.8%
30	93.9%	2.4%	6.1%
35	90.5%	3.7%	9.5%
40	82.8%	8.5%	17.2%
45	73.9%	10.7%	26.1%
50	64.7%	12.5%	35.3%
51+	61.9%	4.3%	38.1%

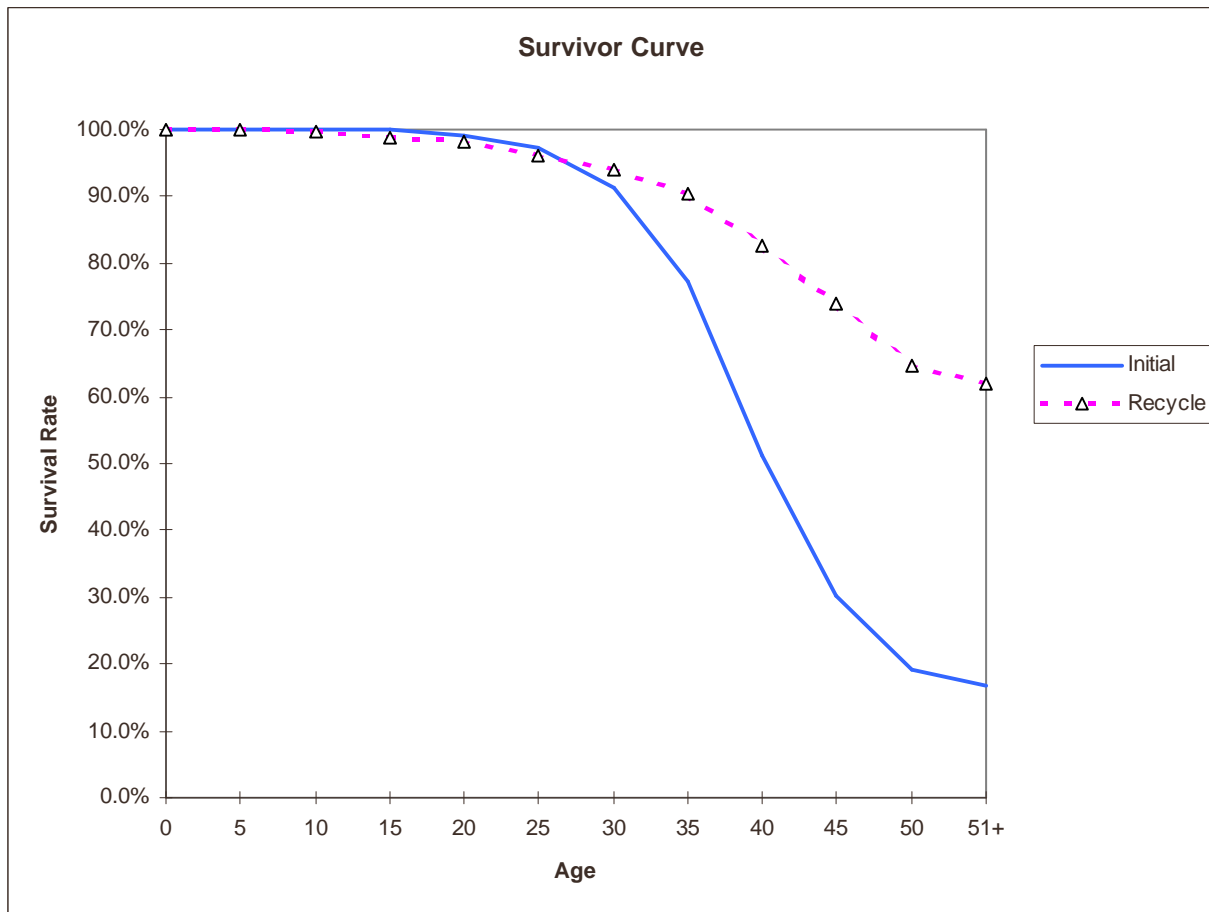


Table 7

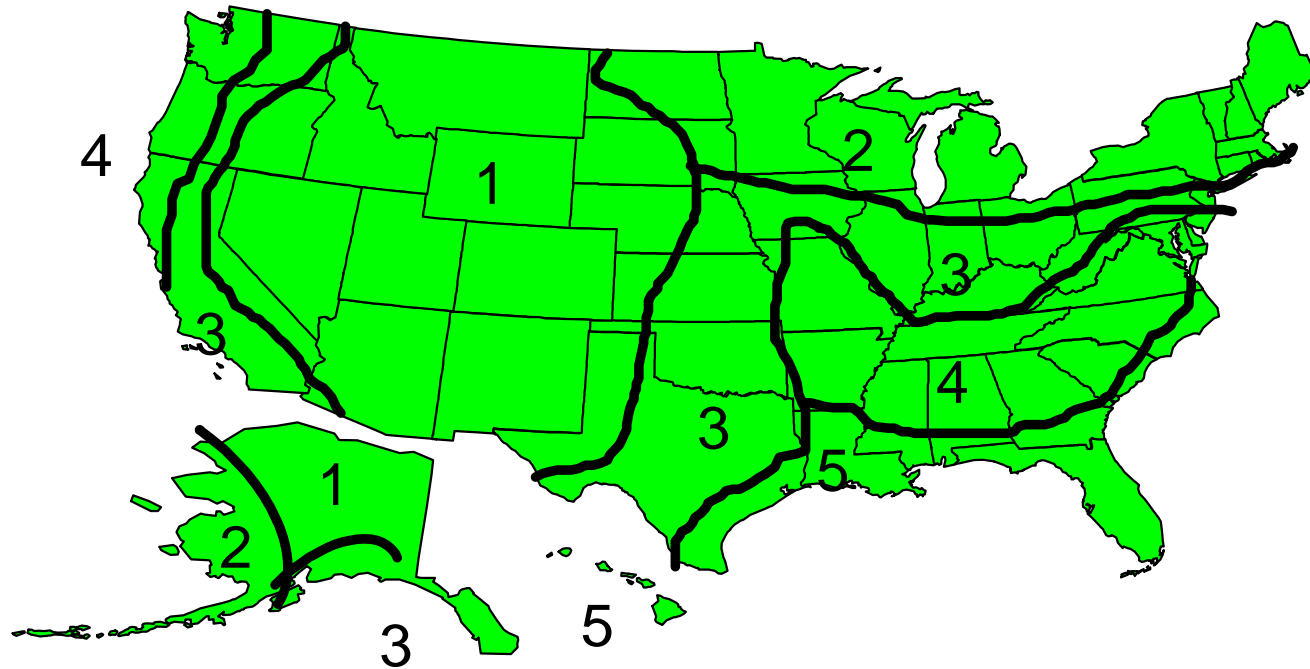
Predicted Service Life

<u>Inspection Cycle</u>	<u>Decay Zone 1</u>	<u>Decay Zone 2</u>	<u>Decay Zone 3</u>	<u>Decay Zone 4</u>	<u>Decay Zone 5</u>
Initial Inspection	49.8 yrs	56.8 yrs	44.5 yrs	43 yrs	40.3 yrs
Osmose Recycle	**	**	**	**	**

* Iowa survival curve method

** Predicted service life can not be computed due to low reject rates

Deterioration Zones



1=Low 2=Moderate 3=Intermediate
4=High 5=Severe

* From the AWWA 1999
Standards