

Comparison of 1980 CSO Nonsmoker to 2001 Residual Standard Nonsmoker Table

**For LHATF Discussion 6/11/2009
Preferred Mortality POG**

Society of Actuaries & American Academy of
Actuaries Joint Project Oversight Group



Objective

- Compare mortality and reserves for guaranteed issue contracts using the 2001 CSO Residual Standard Table versus 1980 CSO

Testing

- Comparison of non-participating whole life NLP reserves using:
 - 2001 CSO Residual Standard S&U Table versus 1980 CSO Ultimate Table
 - 2001 CSO NS Ultimate Table versus 1980 CSO Ultimate Table
 - Male and female, non-tobacco classes only
- Comparison of underlying mortality rates and present value of expected claims for same risk classes as used in the reserve comparison

Comparison of Net Level Premium Reserves using 2001 CSO to those using 1980 CSO

- Products Compared:
 - Whole Life – Issue ages 35, 45, 55 and 75
 - Benefits at end of year
 - Premiums at beginning of year
 - Maturity at attained age 100
- Reserves ignore deficiency reserves
- Calculated using 4% valuation interest rate
- Compared using ANB, Nonsmoker tables

Comparison of Mortality Rates per 1,000 under 2001 CSO to 1980 CSO

- Present value of claims determined as follows:
 - Over years 1-20 and lifetime (i.e., to age 100)
 - Using 5% discount rate
 - Lapse rate = 0% (no significant difference in results if lapses included)

Mortality Comparison

Issue Ages 35, 45, 55 and 75

2001 CSO Preferred Structure Table, Male, Residual
SNS S&U ANB

vs.

2001 CSO NS Ultimate ANB

vs.

1980 CSO, NS Ultimate ANB

Comparison of Underlying Mortality 2001 CSO Residual SNS vs. 1980 CSO NS

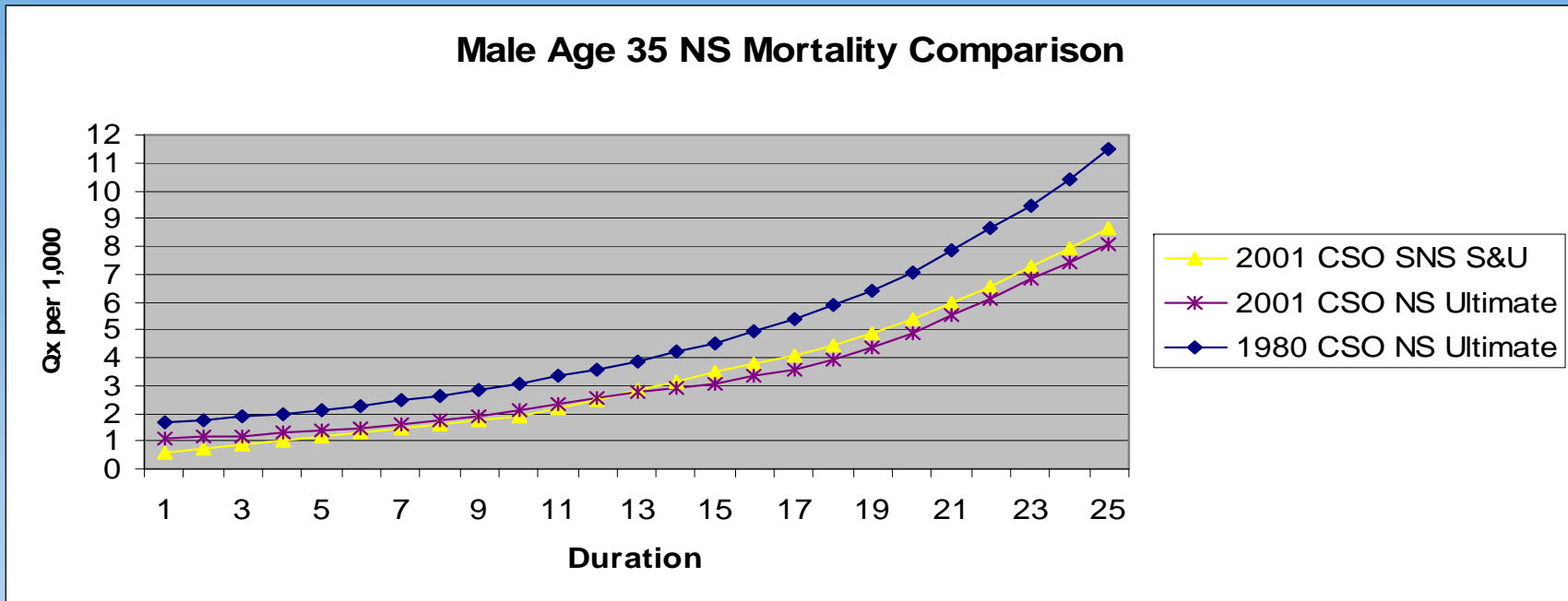
Male Risks

	Present Value of Claims, 5% Discount Rate, 0% Lapse							
	Years 1-20				Lifetime			
	35	45	55	75	35	45	55	75
1980 CSO MNS Ultimate ANB	38.57	87.90	209.82	653.81	166.50	249.16	364.80	664.71
2001 CSO Residual MSNS S&U	25.24	58.74	139.45	520.08	144.27	215.07	310.85	548.08
2001 CSO MNS Ultimate	26.17	63.28	156.27	592.37	141.35	215.38	320.90	611.60

Female Risks

	Present Value of Claims, 5% Discount Rate, 0% Lapse							
	Years 1-20				Lifetime			
	35	45	55	75	35	45	55	75
1980 CSO FNS Ultimate ANB	33.79	67.39	144.72	591.21	145.32	216.16	314.96	612.15
2001 CSO Residual FSNS S&U	20.09	49.27	103.79	436.63	124.02	187.25	267.41	487.01
2001 CSO FNS Ultimate	21.37	51.82	119.09	486.74	121.52	185.59	276.55	532.06

Male, IA 35, 2001 CSO SNS vs. 1980 NS Ultimate – Mortality

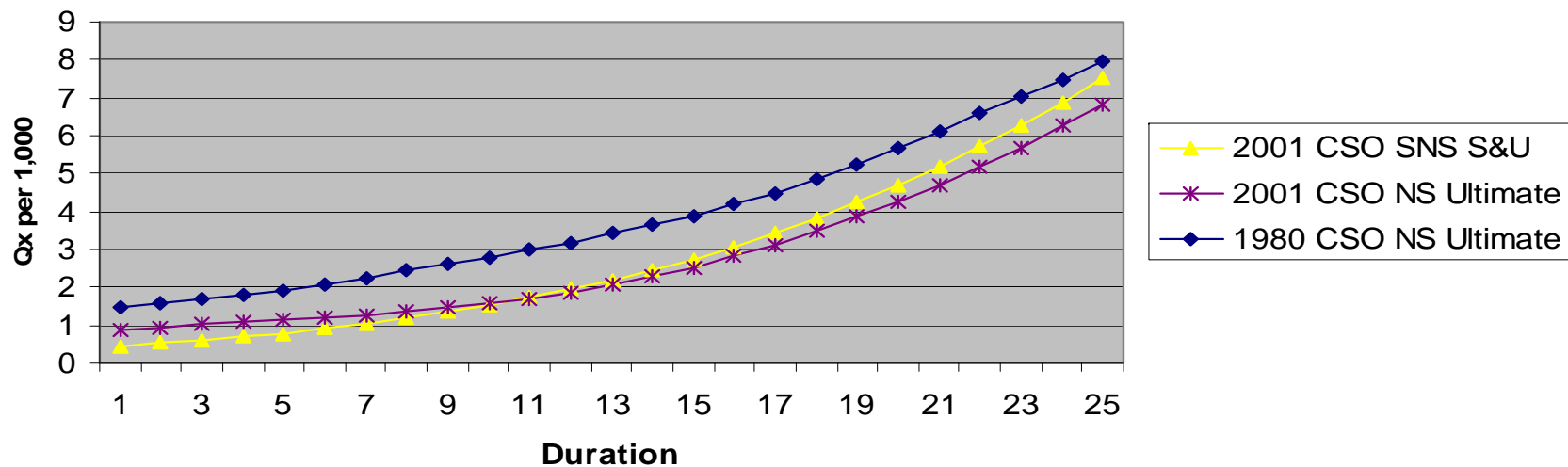


**Comparison of Mortality Rate per 1,000 at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 35**

Duration	1	5	10	20	A Age 95
Ratio 1980 to 2001 S&U	291%	186%	160%	132%	123%
Difference p/1,000	1.11	0.99	1.15	1.70	62.77
Ratio 1980 to 2001 Ult	155%	156%	146%	146%	123%
Difference p/1,000	0.60	0.77	0.97	2.22	62.77

Female, IA 35, 2001 CSO SNS vs. 1980 NS Ultimate – Mortality

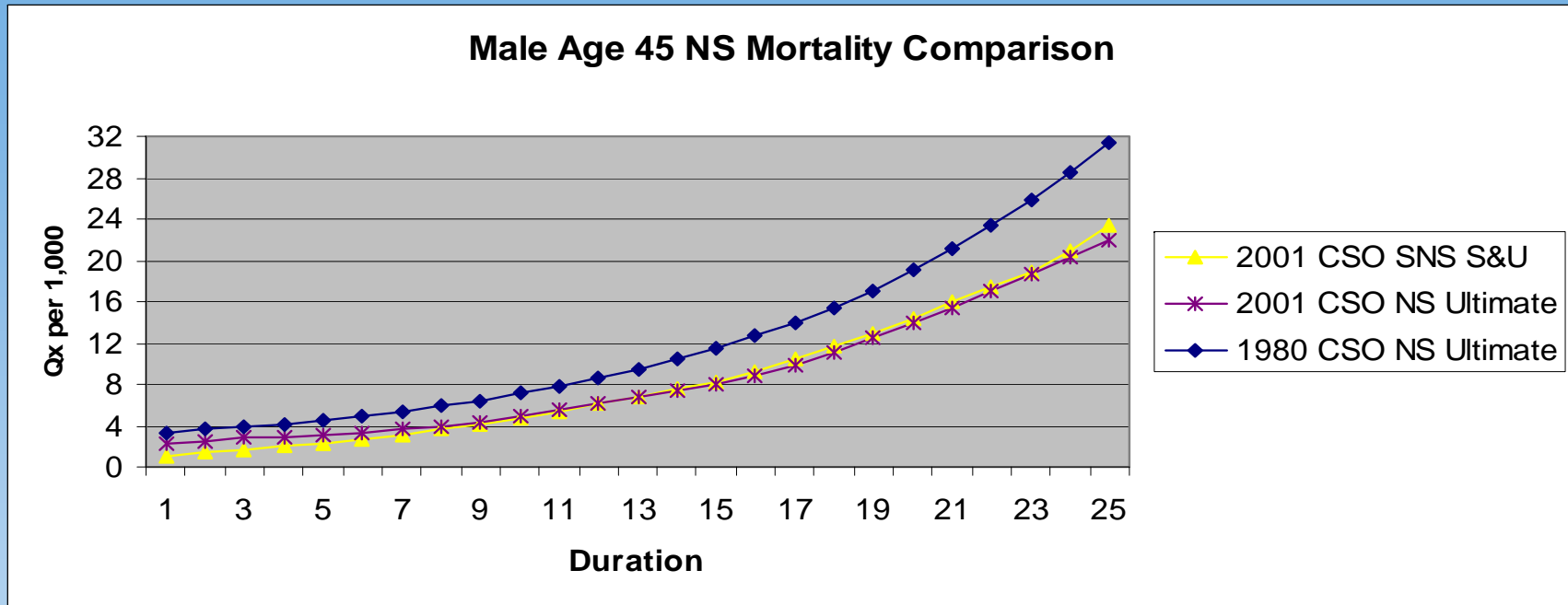
Female Age 35 NS Mortality Comparison



Comparison of Mortality Rate per 1,000 at Select Durations 1980 CSO vs 2001 CSO SNS, Issue Age 35

Duration	1	5	10	20	A Age 95
Ratio 1980 to 2001 S&U	320%	244%	184%	121%	164%
Difference p/1,000	1.01	1.14	1.28	1.00	124.40
Ratio 1980 to 2001 Ult	165%	171%	178%	134%	164%
Difference p/1,000	0.58	0.80	1.23	1.43	124.40

Male, IA 45, 2001 CSO SNS vs. 1980 NS Ultimate – Mortality

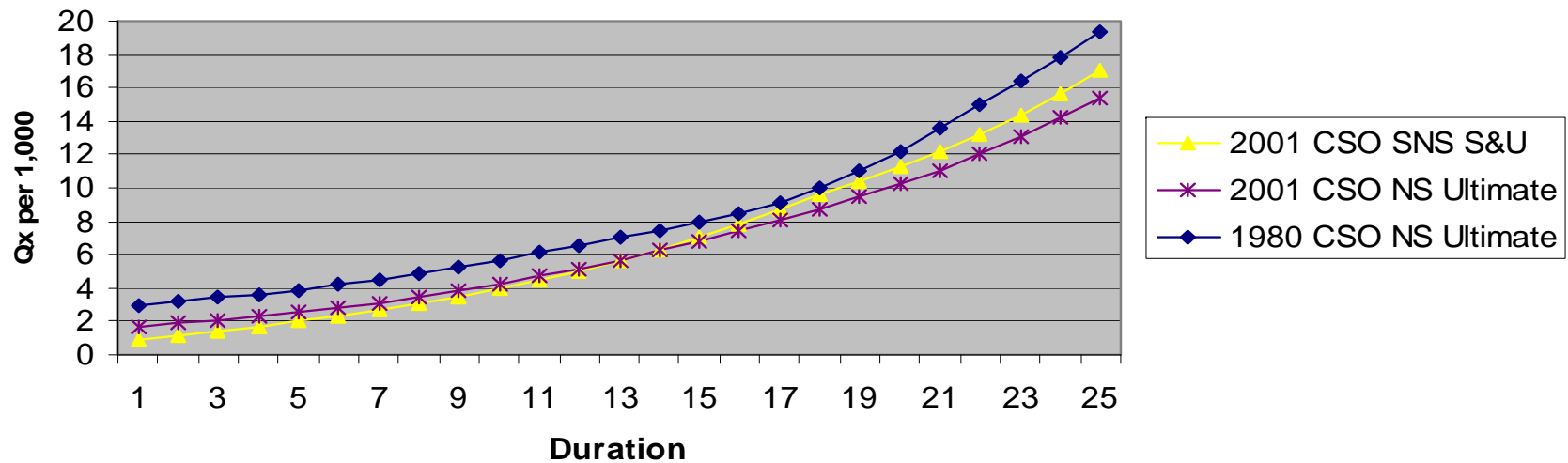


Comparison of Mortality Rate per 1,000 at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 45

Duration	1	5	10	20	A Age 95
Ratio 1980 to 2001 S&U	296%	196%	153%	132%	123%
Difference p/1,000	2.20	2.22	2.46	4.56	62.77
Ratio 1980 to 2001 Ult	142%	147%	146%	136%	123%
Difference p/1,000	0.99	1.45	2.22	5.07	62.77

Female, IA 45, 2001 CSO SNS vs. 1980 NS Ultimate – Mortality

Female Age 45 NS Mortality Comparison

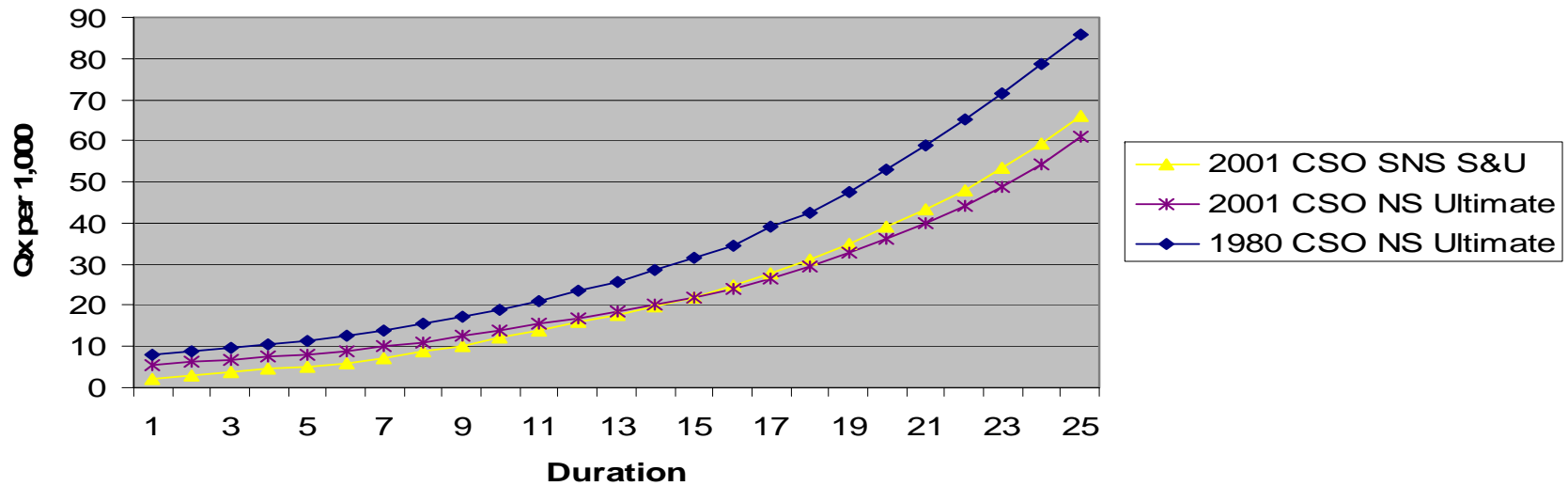


Comparison of Mortality Rate per 1,000 at Select Durations 1980 CSO vs 2001 CSO SNS, Issue Age 45

Duration	1	5	10	20	A Age 95
Ratio 1980 to 2001 S&U	322%	196%	144%	109%	164%
Difference p/1,000	2.06	1.91	1.73	0.97	124.40
Ratio 1980 to 2001 Ult	175%	154%	134%	120%	164%
Difference p/1,000	1.28	1.37	1.43	2.03	124.40

Male, IA 55, 2001 CSO SNS vs. 1980 NS Ultimate – Mortality

Male Age 55 NS Mortality Comparison

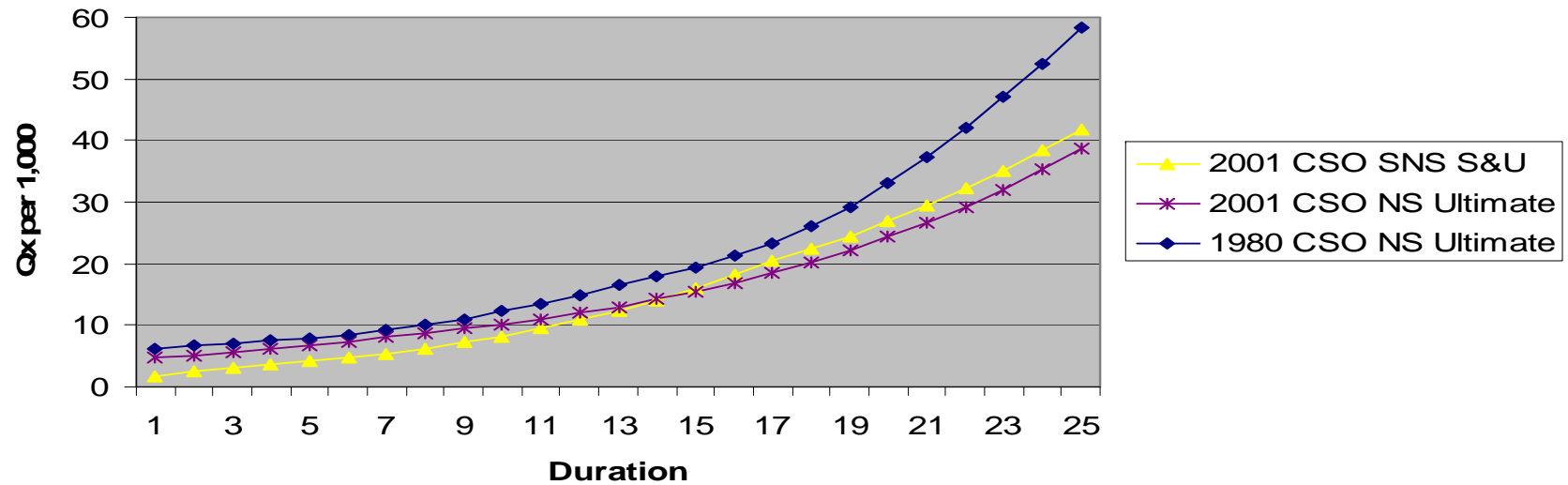


Comparison of Mortality Rate per 1,000 at Select Durations 1980 CSO vs 2001 CSO SNS, Issue Age 55

Duration	1	5	10	20	A Age 95
Ratio 1980 to 2001 S&U	355%	224%	156%	136%	123%
Difference p/1,000	5.62	6.36	6.85	13.93	62.77
Ratio 1980 to 2001 Ult	142%	142%	136%	146%	123%
Difference p/1,000	2.32	3.37	5.07	16.65	62.77

Female, IA 55, 2001 CSO SNS vs. 1980 NS Ultimate – Mortality

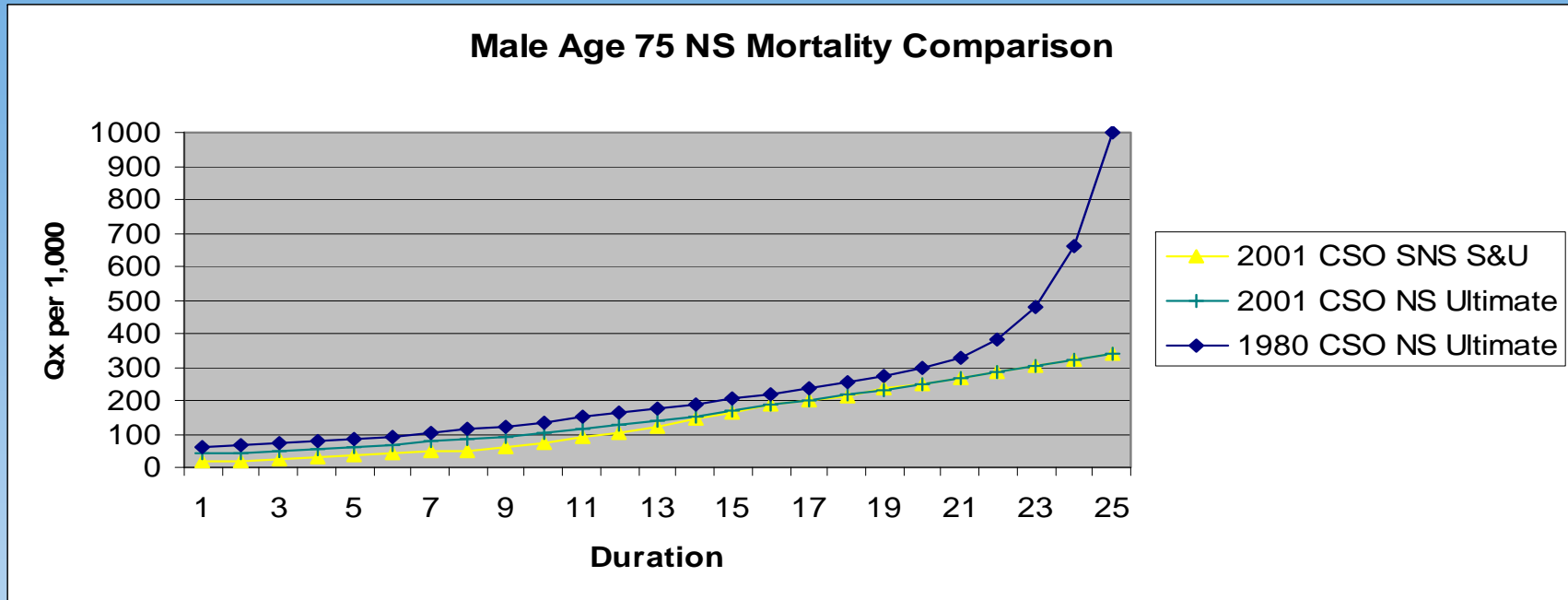
Female Age 55 Class 3 NS Mortality Comparison



Comparison of Mortality Rate per 1,000 at Select Durations 1980 CSO vs 2001 CSO SNS, Issue Age 55

Duration	1	5	10	20	A Age 95
Ratio 1980 to 2001 S&U	341%	195%	149%	123%	164%
Difference p/1,000	4.33	3.88	4.01	6.19	124.40
Ratio 1980 to 2001 Ult	131%	117%	120%	136%	164%
Difference p/1,000	1.45	1.14	2.03	8.74	124.40

Male, IA 75, 2001 CSO SNS vs. 1980 NS Ultimate – Mortality

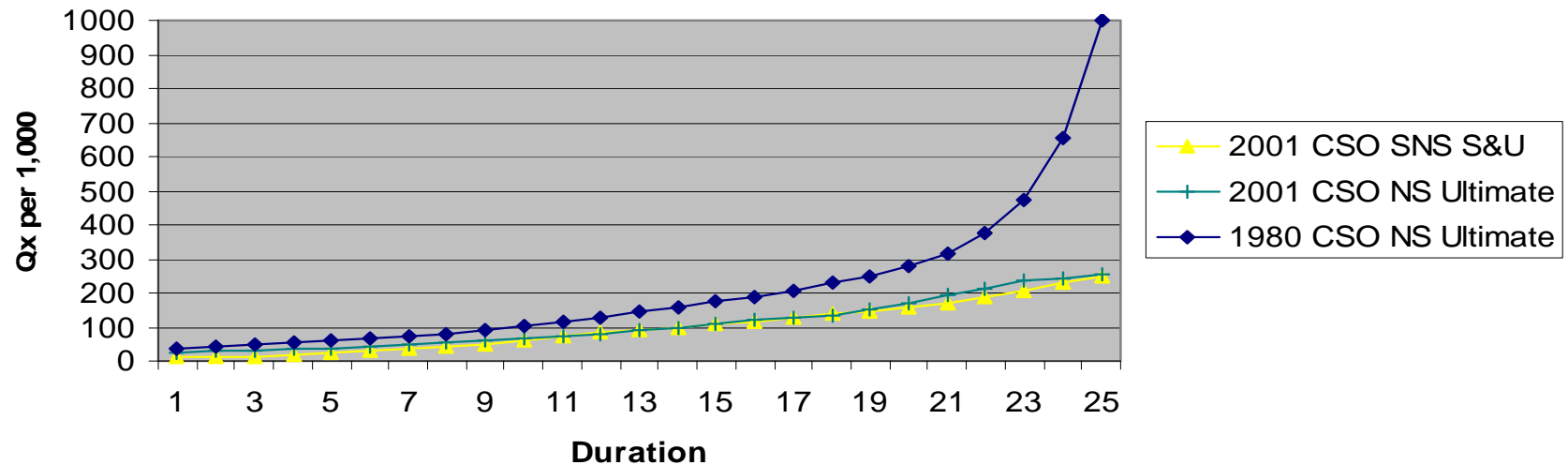


**Comparison of Mortality Rate per 1,000 at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 75**

Duration	1	5	10	20	A Age 95
Ratio 1980 to 2001 S&U	373%	252%	181%	118%	124%
Difference p/1,000	43.03	51.69	61.08	45.60	63.04
Ratio 1980 to 2001 Ult	147%	141%	132%	119%	123%
Difference p/1,000	18.77	24.85	33.11	46.60	62.77

Female, IA 75, 2001 CSO SNS vs. 1980 NS Ultimate – Mortality

Female Age 75 Class 3 NS Mortality Comparison



Comparison of Mortality Rate per 1,000 at Select Durations 1980 CSO vs 2001 CSO SNS, Issue Age 75

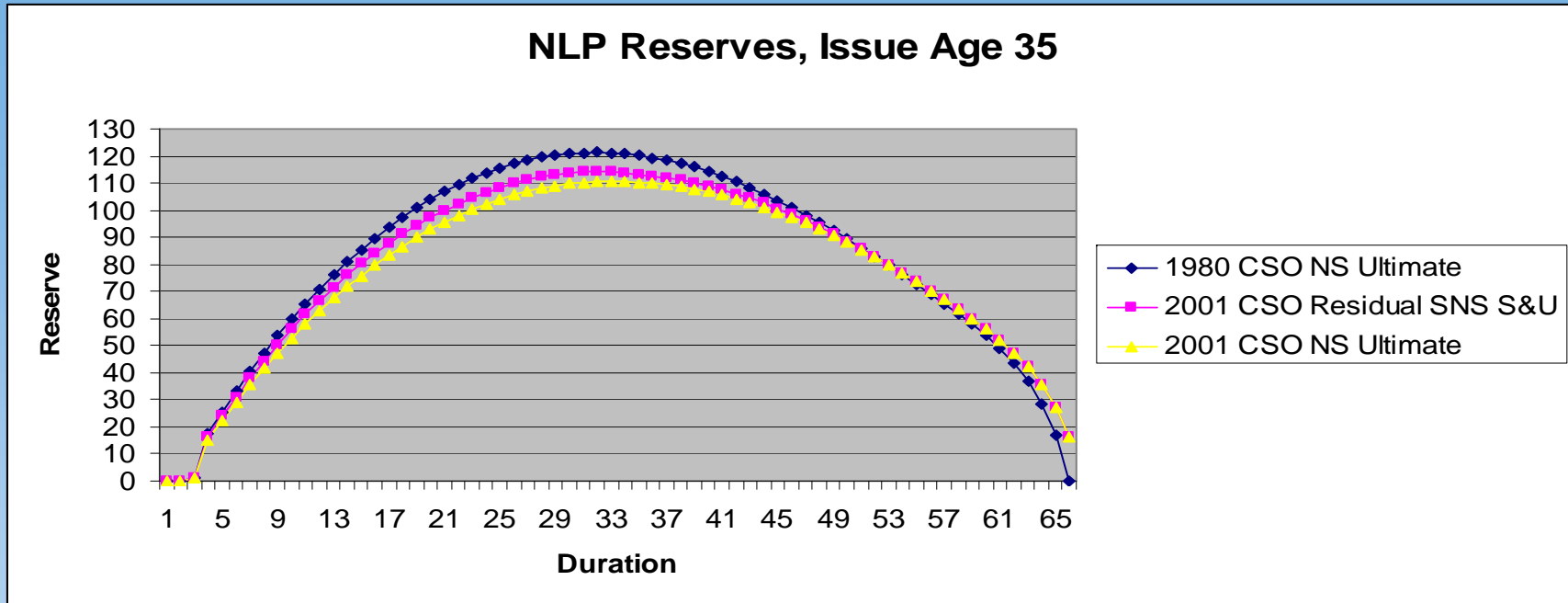
Duration	1	5	10	20	A Age 95
Ratio 1980 to 2001 S&U	341%	259%	171%	178%	185%
Difference p/1,000	26.38	35.90	42.65	122.36	145.83
Ratio 1980 to 2001 Ult	140%	151%	157%	165%	164%
Difference p/1,000	10.68	19.82	37.41	109.67	124.40

Whole Life Reserve Comparison

Issue Ages 35, 45, 55, and 75
2001 CSO Residual SNS S&U and 2001 CSO NS
Ultimate
vs.
1980 CSO NS Ultimate

Male, IA 35, Non-Smoker

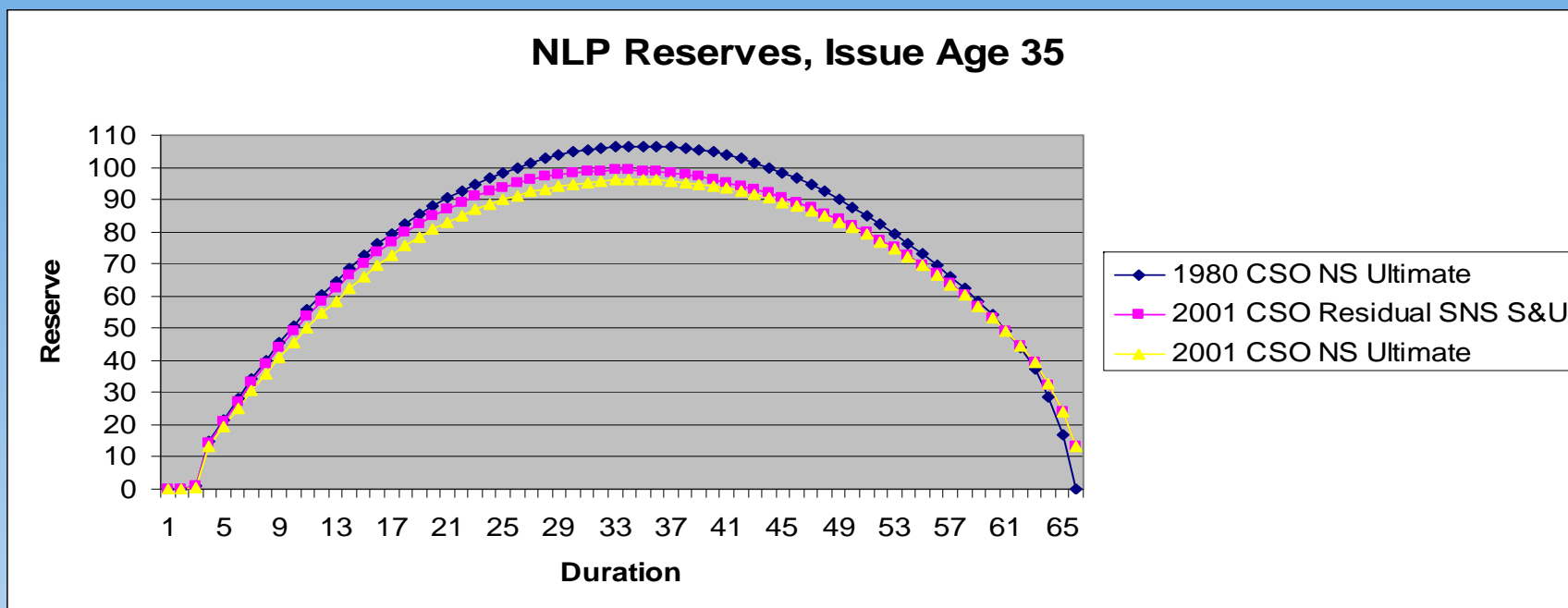
2001 CSO vs. 1980 CSO – Whole Life Reserves



**Comparison of NLP Reserves at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 35**

Duration	1	5	10	20	30	40	50	NLP
1980 CSO MNS Ult	\$0.00	\$33.02	\$65.49	\$106.86	\$121.22	\$112.46	\$86.15	\$ 10.72
2001 CSO MSNS S&U	\$0.00	\$31.11	\$61.58	\$99.87	\$114.02	\$107.56	\$85.81	\$ 9.26
2001 CSO MSNS Ult	\$0.00	\$29.00	\$57.99	\$95.63	\$110.34	\$105.54	\$85.47	\$ 9.04
Ratio 2001 S&U to 80CSO		94%	94%	93%	94%	96%	100%	86%
Ratio 2001 Ult to 80CSO		88%	89%	89%	91%	94%	99%	84%

Female, IA 35, Non-Smoker 2001 CSO vs. 1980 CSO – Whole Life Reserves

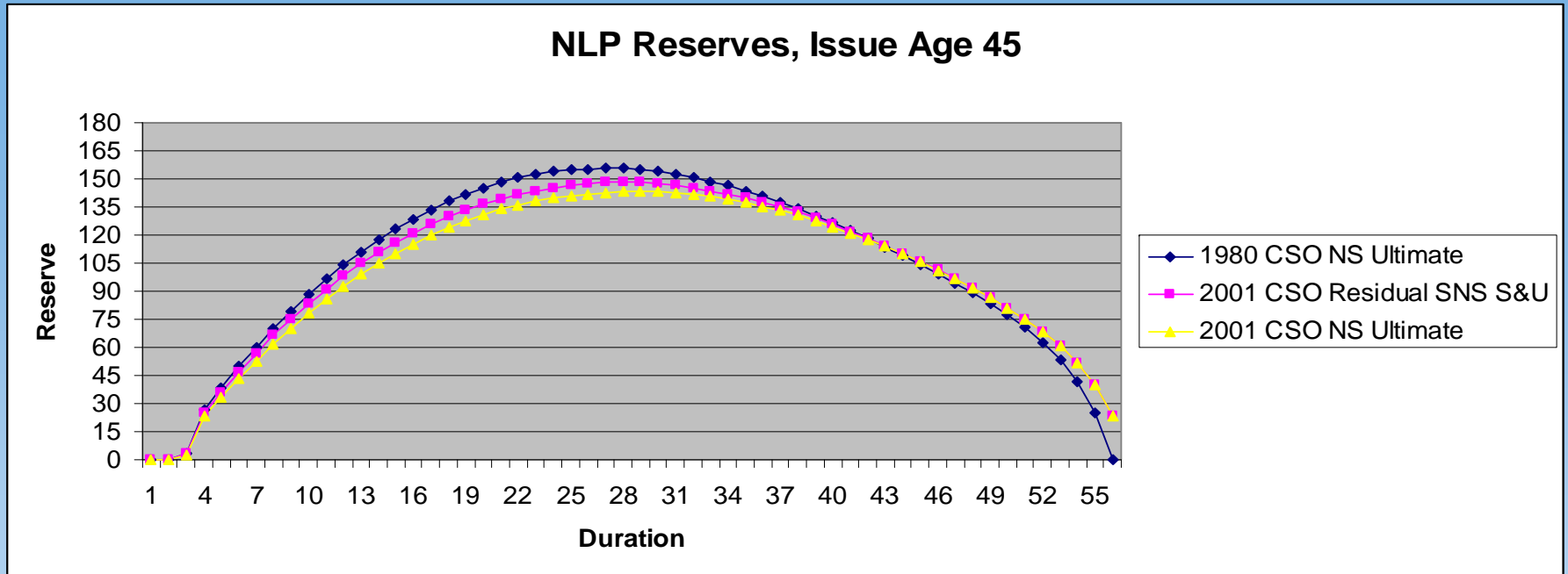


**Comparison of NLP Reserves at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 35**

Duration	1	5	10	20	30	40	50	NLP
1980 CSO FNS Ult	\$0.00	\$28.21	\$55.61	\$90.55	\$105.52	\$103.86	\$85.03	\$ 9.22
2001 CSO FSNS S&U	\$0.00	\$27.07	\$53.82	\$87.08	\$98.62	\$95.37	\$79.66	\$ 7.96
2001 CSO FSNS Ult	\$0.00	\$24.99	\$50.17	\$82.98	\$95.32	\$93.39	\$79.11	\$ 7.77
Ratio 2001 S&U to 80CSO		96%	97%	96%	93%	92%	94%	86%
Ratio 2001 Ult to 80CSO		89%	90%	92%	90%	90%	93%	84%

Male, IA 45, Non-Smoker

2001 CSO vs. 1980 CSO – Whole Life Reserves

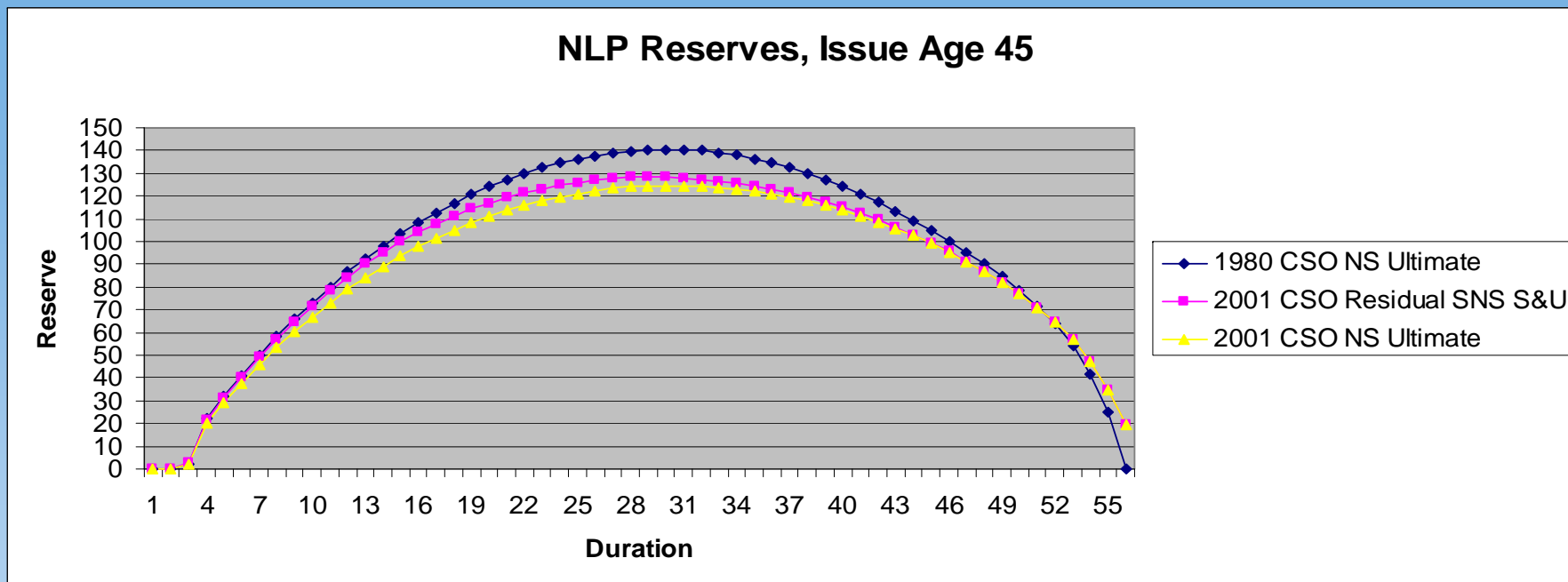


**Comparison of NLP Reserves at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 45**

Duration	1	5	10	20	30	40	50	NLP
1980 CSO MNS Ult	\$0.00	\$49.64	\$96.48	\$148.07	\$152.56	\$122.25	\$70.66	\$ 16.85
2001 CSO MSNS S&U	\$0.00	\$46.87	\$90.96	\$139.40	\$146.47	\$122.07	\$75.31	\$ 14.23
2001 CSO MSNS Ult	\$0.00	\$43.34	\$85.55	\$133.82	\$142.47	\$121.20	\$75.30	\$ 14.22
Ratio 2001 S&U to 80CSO		94%	94%	94%	96%	100%	107%	84%
Ratio 2001 Ult to 80CSO		87%	89%	90%	93%	99%	107%	84%

Female, IA 45, Non-Smoker

2001 CSO vs. 1980 CSO – Whole Life Reserves

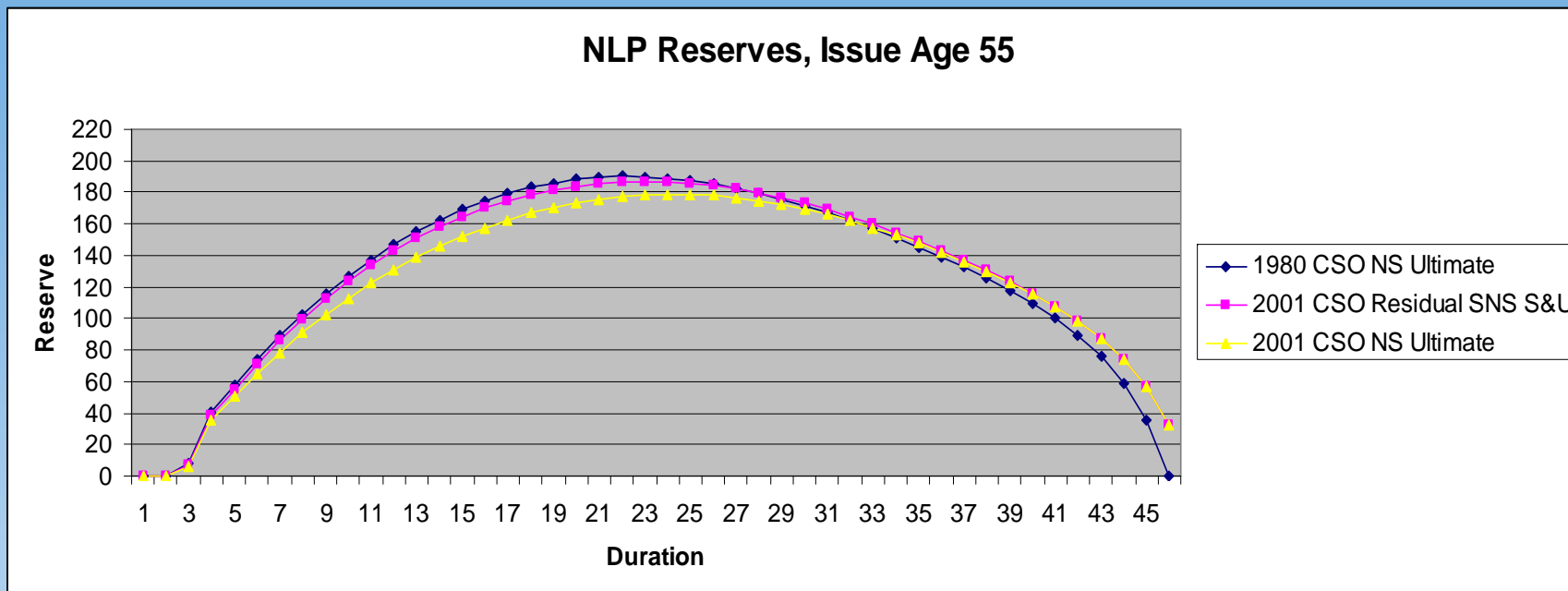


Comparison of NLP Reserves at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 45

Duration	1	5	10	20	30	40	50	NLP
1980 CSO FNS Ult	\$0.00	\$41.04	\$80.06	\$127.42	\$140.43	\$120.89	\$71.52	\$ 14.16
2001 CSO FSNS S&U	\$0.00	\$40.38	\$78.26	\$119.34	\$127.97	\$112.33	\$71.10	\$ 12.23
2001 CSO FSNS Ult	\$0.00	\$37.56	\$73.17	\$113.68	\$124.60	\$111.34	\$71.14	\$ 12.07
Ratio 2001 S&U to 80CSO		98%	98%	94%	91%	93%	99%	86%
Ratio 2001 Ult to 80CSO		92%	91%	89%	89%	92%	99%	85%

Male, IA 55, Non-Smoker

2001 CSO vs. 1980 CSO – Whole Life Reserves

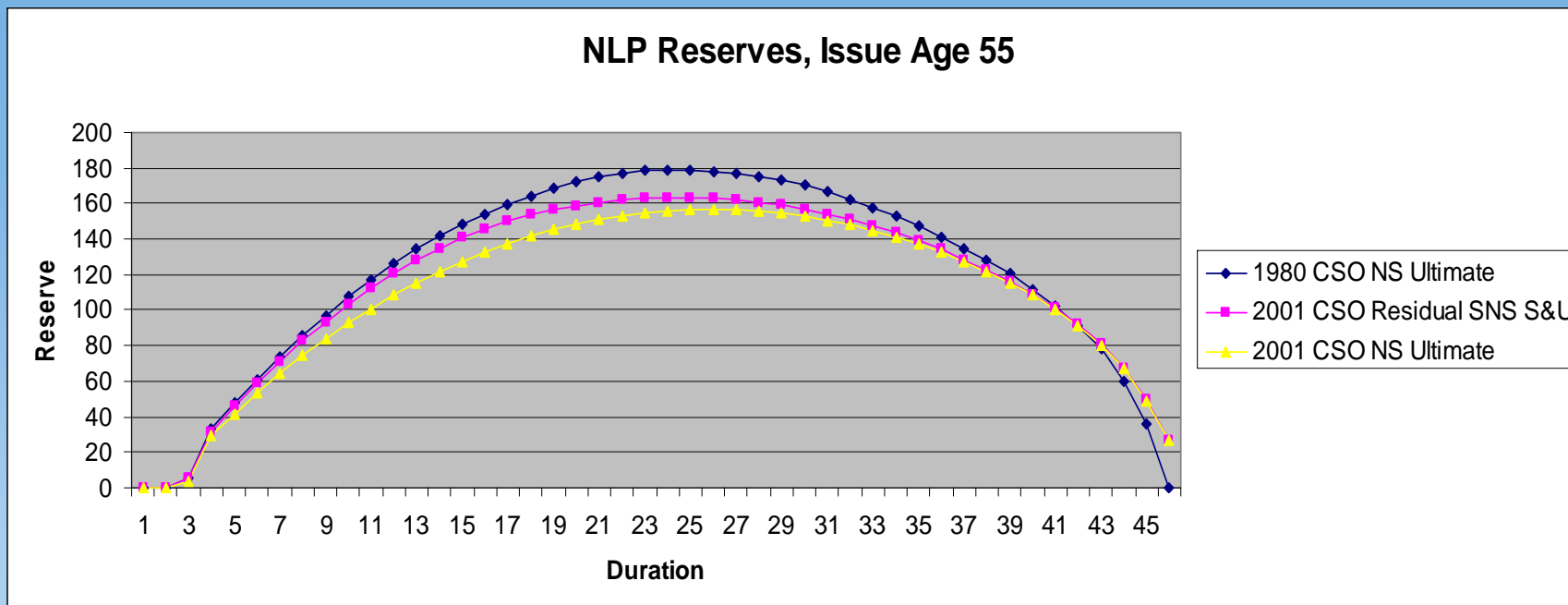


**Comparison of NLP Reserves at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 55**

Duration	1	5	10	20	30	40	NLP
1980 CSO MNS Ult	\$0.00	\$74.03	\$137.31	\$189.54	\$167.21	\$100.42	\$ 27.67
2001 CSO MSNS S&U	\$0.00	\$70.96	\$133.85	\$185.66	\$168.91	\$107.56	\$ 22.24
2001 CSO MSNS Ult	\$0.00	\$64.98	\$122.47	\$175.66	\$165.81	\$107.06	\$ 23.19
Ratio 2001 S&U to 80CSO		96%	97%	98%	101%	107%	80%
Ratio 2001 Ult to 80CSO		88%	89%	93%	99%	107%	84%

Female, IA 55, Non-Smoker

2001 CSO vs. 1980 CSO – Whole Life Reserves

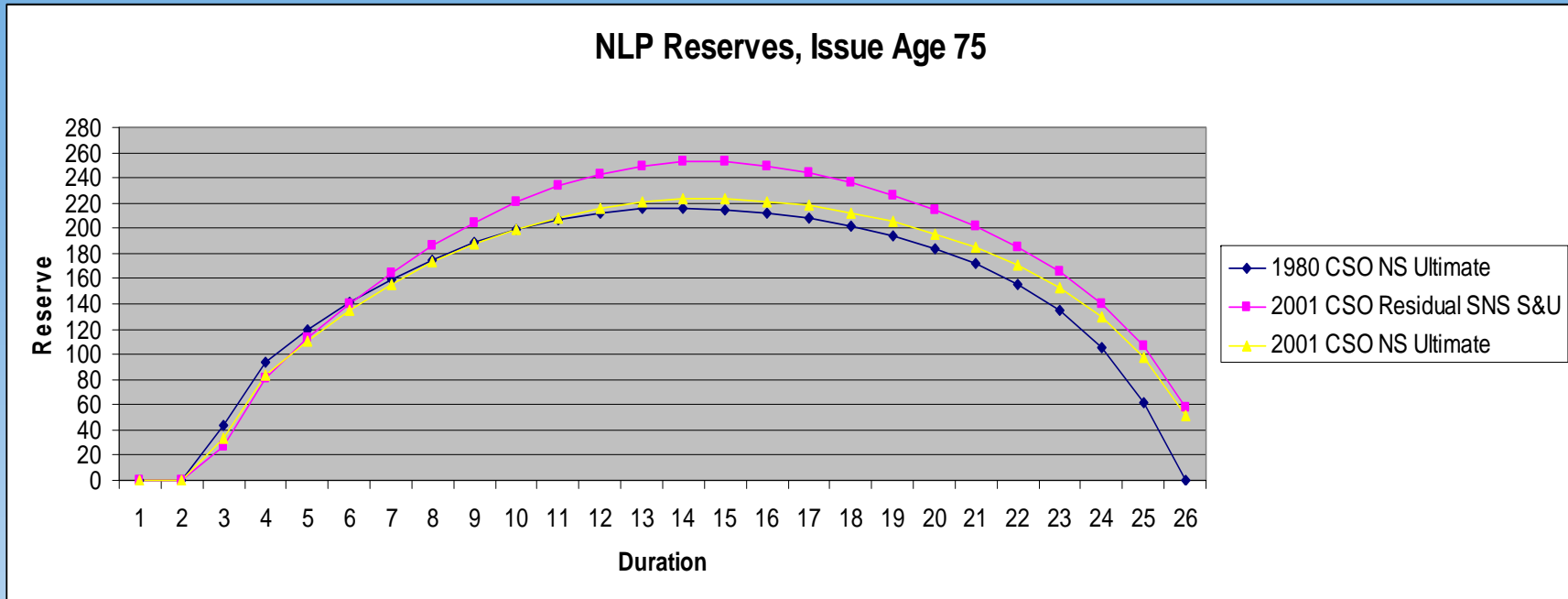


**Comparison of NLP Reserves at Select Durations
1980 CSO vs 2001 CSO SNS, Issue Age 55**

Duration	1	5	10	20	30	40	NLP
1980 CSO FNS Ult	\$0.00	\$60.99	\$117.40	\$174.95	\$166.64	\$102.51	\$ 22.44
2001 CSO FSNS S&U	\$0.00	\$58.86	\$112.42	\$160.79	\$154.13	\$101.21	\$ 18.49
2001 CSO FSNS Ult	\$0.00	\$53.27	\$100.84	\$150.85	\$150.64	\$100.67	\$ 19.23
Ratio 2001 S&U to 80CSO		97%	96%	92%	92%	99%	82%
Ratio 2001 Ult to 80CSO		87%	86%	86%	90%	98%	86%

Male, IA 75, Non-Smoker

2001 CSO vs. 1980 CSO – Whole Life Reserves



Female, IA 75, Non-Smoker 2001 CSO vs. 1980 CSO – Whole Life Reserves

