

TABLE B-1. DISCOUNTED COSTS OF OPTIONS ASSUMING THREE-YEAR PROJECT DELAYS FOR AVLIS AND AGC

	Base/DOE Plan	Initial Analysis		With Delays	
		Option III	Option IV	Option III	Option IV
<b>Discounted Enterprise Costs in Billions of 1983 Dollars</b>					
Gaseous Diffusion	90.9	58.5	44.8	71.9	52.0
Gas Centrifuge	45.6	1.4	78.7	1.4	73.9
AVLIS	None	68.3	None	58.9	None
<b>Full-Period Total</b>	<b>136.8</b>	<b>128.2</b>	<b>123.5</b>	<b>132.2</b>	<b>125.9</b>
1983-2003 Total	87.4	85.4	82.3	89.3	84.7
<b>Discounted Federal Outlays in Billions of 1983 Dollars</b>					
1983-1990	17.9	15.2	18.2	15.1	18.2
1991-2000	11.3	13.1	7.8	16.7	9.8
2001-2025	12.2	4.7	2.0	5.0	2.5
<b>Full-Period Total</b>	<b>41.4</b>	<b>33.0</b>	<b>28.0</b>	<b>36.8</b>	<b>30.5</b>
<b>Costs per SWU in 1983 Dollars</b>					
Full-Period Total					
Fuel Cost	129.4	121.3	116.8	125.0	119.2
Full-Period Enrichment Charge	39.4	31.3	26.7	34.9	29.1

SOURCE: Congressional Budget Office.

NOTE: Both the AVLIS and AGC technologies are assumed to come on-line three years later than the current schedules projected in the initial analysis.

TABLE B-2. DISCOUNTED COSTS OF OPTIONS ASSUMING PROJECT COST OVERRUNS

	Base/DOE Plan	Option I	Option II	Option III	Option IV
<b>Discounted Enterprise Costs in Billions of 1983 Dollars</b>					
Gaseous Diffusion	90.9	46.6	53.7	58.5	44.8
Gas Centrifuge	46.6	46.6	15.4	1.4	85.4
AVLIS	None	40.1	67.4	75.5	None
<b>Full-Period Total</b>	<b>137.5</b>	<b>133.3</b>	<b>136.5</b>	<b>135.4</b>	<b>130.2</b>
1983-2003 Total	87.9	87.6	89.3	88.5	86.9
<b>Discounted Federal Outlays in Billions of 1983 Dollars</b>					
1983-1990	18.3	19.3	17.4	15.5	21.3
1991-2000	11.5	12.1	15.1	16.2	9.7
2001-2025	12.3	6.5	8.7	8.6	3.6
<b>Full-Period Total</b>	<b>42.1</b>	<b>37.9</b>	<b>41.2</b>	<b>40.3</b>	<b>34.6</b>
<b>Costs per SWU in 1983 Dollars</b>					
Full-Period Total					
Fuel Cost	130.1	126.0	129.1	128.2	123.2
Full-Period Enrichment Charge	40.0	36.0	39.0	38.1	33.1

SOURCE: Congressional Budget Office.

NOTE: A 100 percent cost overrun factor was assumed for the capital plant and equipment portion of AVLIS. A 100 percent overrun factor was applied to AGC machine costs. A 60 percent factor applied to the building costs of the GCEP/AGC facility. An 8 percent overrun factor was assumed for the plant and machine costs for the GCEP complex.

TABLE B-3. DISCOUNTED COSTS OF OPTIONS ASSUMING A 6 PERCENT REAL DISCOUNT RATE

	Base/DOE Plan	Option I	Option II	Option III	Option IV
<b>Discounted Enterprise Costs in Billions of 1983 Dollars</b>					
Gaseous Diffusion	70.1	42.1	47.9	51.8	40.5
Gas Centrifuge	31.3	31.3	10.8	1.4	52.4
AVLIS	None	23.2	38.6	43.2	None
<b>Full-Period Total</b>	<b>101.4</b>	<b>96.6</b>	<b>97.3</b>	<b>96.4</b>	<b>92.9</b>
1983-2003 Total	73.2	71.8	72.5	72.0	69.4
<b>Discounted Federal Outlays in Billions of 1983 Dollars</b>					
1983-1990	16.8	17.5	15.9	14.3	17.0
1991-2000	9.1	8.3	9.9	10.6	6.4
2001-2025	7.2	2.6	3.0	2.8	1.2
<b>Full-Period Total</b>	<b>33.1</b>	<b>28.4</b>	<b>28.8</b>	<b>27.7</b>	<b>24.6</b>
<b>Costs per SWU in 1983 Dollars</b>					
Full-Period Total					
Fuel Cost	95.9	91.3	92.0	91.2	87.9
Full-Period Enrichment Charge	30.6	26.0	26.7	25.9	22.6

SOURCE: Congressional Budget Office.

TABLE B-4. COSTS OF OPTIONS ASSUMING A ZERO PERCENT REAL DISCOUNT RATE

	Base/DOE Plan	Option I	Option II	Option III	Option IV
<b>Discounted Enterprise Costs in Billions of 1983 Dollars</b>					
Gaseous Diffusion	182.3	58.3	69.4	76.8	56.0
Gas Centrifuge	112.8	112.8	34.1	1.4	201.6
AVLIS	None	98.7	168.5	190.4	None
<b>Full-Period Total</b>	<b>295.1</b>	<b>269.8</b>	<b>272.0</b>	<b>268.6</b>	<b>257.6</b>
1983-2003 Total	130.9	126.2	127.8	126.3	121.4
<b>Discounted Federal Outlays in Billions of 1983 Dollars</b>					
1983-1990	20.7	21.5	19.4	17.4	21.0
1991-2000	17.9	15.4	18.9	20.4	11.7
2001-2025	38.2	13.5	16.0	14.6	6.3
<b>Full-Period Total</b>	<b>76.8</b>	<b>50.4</b>	<b>54.3</b>	<b>52.4</b>	<b>39.0</b>
<b>Costs per SWU in 1983 Dollars</b>					
Full-Period Total					
Fuel Cost	279.2	255.2	257.2	254.2	243.7
Full-Period Enrichment Charge	76.6	52.6	54.6	51.6	41.1

SOURCE: Congressional Budget Office.

TABLE B-5. DISCOUNTED COSTS OF OPTIONS ASSUMING A REAL POWER INFLATION RATE OF 2.0 PERCENT

	Base/DOE Plan	Option I	Option II	Option III	Option IV
<b>Discounted Enterprise Costs in Billions of 1983 Dollars</b>					
Gaseous Diffusion	97.5	47.7	55.3	60.3	45.8
Gas Centrifuge	45.9	45.9	15.1	1.4	78.7
AVLIS	None	36.2	60.8	68.3	None
<b>Full-Period Total</b>	<b>143.4</b>	<b>129.8</b>	<b>131.2</b>	<b>130.0</b>	<b>124.5</b>
1983-2003 Total	89.8	86.4	87.7	87.2	83.3
<b>Discounted Federal Outlays in Billions of 1983 Dollars</b>					
1983-1990	18.5	19.3	17.6	15.8	18.8
1991-2000	12.7	10.6	13.1	14.3	8.2
2001-2025	16.8	4.4	5.1	4.7	2.0
<b>Full-Period Total</b>	<b>48.0</b>	<b>34.3</b>	<b>35.8</b>	<b>34.8</b>	<b>29.0</b>
<b>Costs per SWU in 1983 Dollars</b>					
Full-Period Total					
Fuel Cost	135.7	122.7	124.1	123.1	117.8
Full-Period Enrichment Charge	45.6	32.7	34.0	33.0	27.7

SOURCE: Congressional Budget Office.

TABLE B-6. DISCOUNTED COSTS OF OPTIONS ASSUMING FULL CAPACITY USED AT 75 PERCENT

	Base/DOE Plan	Option I	Option II	Option III	Option IV
<b>Discounted Enterprise Costs in Billions of 1983 Dollars</b>					
Gaseous Diffusion	68.4	46.4	53.5	57.6	43.8
Gas Centrifuge	41.3	41.3	13.9	1.4	58.7
AVLIS	None	18.8	40.1	47.0	None
<b>Full-Period Total</b>	<b>109.7</b>	<b>106.5</b>	<b>107.5</b>	<b>106.0</b>	<b>102.5</b>
1983-2003 Total	80.4	79.2	80.2	79.3	76.6
<b>Discounted Federal Outlays in Billions of 1983 Dollars</b>					
1983-1990	17.9	18.7	16.9	15.2	18.2
1991-2000	10.6	9.8	11.9	12.6	7.5
2001-2025	6.3	3.1	4.0	3.5	1.9
<b>Full-Period Total</b>	<b>34.8</b>	<b>31.6</b>	<b>32.8</b>	<b>31.3</b>	<b>27.6</b>
<b>Costs per SWU in 1983 Dollars</b>					
Full-Period Total					
Fuel Cost	126.4	122.8	124.0	122.2	118.1
Full-Period Enrichment Charge	40.4	36.8	38.1	36.2	32.1

SOURCE: Congressional Budget Office.

NOTE: Cumulative SWU production for each option is 865 millions SWUs.

TABLE B-7. DISCOUNTED COST OF OPTIONS ASSUMING CAPACITY SCALED DOWN TO MEET LOW DEMAND

	Base/DOE Plan	Option I	Option II	Option III	Option IV
<b>Discounted Enterprise Costs in Billions of 1983 Dollars</b>					
Gaseous Diffusion	57.7	40.7	46.7	50.2	39.8
Gas Centrifuge	41.3	41.3	13.9	1.4	53.6
AVLIS	None	15.0	37.2	44.2	None
<b>Full-Period Total</b>	<b>99.0</b>	<b>97.0</b>	<b>97.8</b>	<b>95.8</b>	<b>93.4</b>
1983-2003 Total	70.0	70.1	70.8	69.5	68.0
<b>Discounted Federal Outlays in Billions of 1983 Dollars</b>					
1983-1990	17.4	18.1	16.3	14.5	17.5
1991-2000	7.7	7.7	9.5	9.9	6.0
2001-2025	5.9	3.1	3.9	3.5	1.9
<b>Full-Period Total</b>	<b>31.0</b>	<b>28.9</b>	<b>29.7</b>	<b>27.9</b>	<b>25.4</b>
<b>Costs per SWU in 1983 Dollars</b>					
Full-Period Total Fuel Cost	122.7	120.1	121.0	118.7	115.8
Full-Period Enrichment Charge	38.6	36.1	36.9	34.6	31.8

SOURCE: Congressional Budget Office.

NOTE: Cumulative SWU production for each option is 807 millions SWUs.

TABLE B-8. THE BASE/DOE PLAN ASSUMING LOW SWU DEMAND

Year	Annual SWU Production (In millions of SWUs)			Discounted Enterprise Costs (In millions of 1983 dollars)	Discounted Federal Outlays
	Gaseous Diffusion	GCEP	Total		
1983	11.5	0.0	11.5	3,388	2,045
1984	13.3	0.0	13.3	3,896	2,300
1985	15.9	0.0	15.9	4,486	2,400
1986	13.8	0.0	13.8	3,851	2,111
1987	17.5	0.0	17.5	4,550	2,256
1988	17.3	0.4	17.6	4,450	2,196
1989	17.0	1.1	18.1	4,400	2,135
1990	17.4	3.1	20.5	4,533	1,991
1991	16.3	5.2	21.5	4,383	1,724
1992	13.2	7.3	20.5	4,310	1,847
1993	8.7	9.6	18.3	3,178	987
1994	7.0	11.7	18.7	3,397	1,083
1995	5.9	13.0	18.9	2,731	391
1996	5.5	13.1	18.6	2,583	361
1997	5.3	13.2	18.5	2,467	341
1998	5.4	13.2	18.6	2,381	329
1999	4.9	13.2	18.1	2,236	306
2000	5.4	13.2	18.6	2,207	307
2001	6.4	13.2	19.6	2,265	353
2002	6.4	13.2	19.6	2,180	340
2003	6.4	13.2	19.6	2,097	328
2004	6.4	13.2	19.6	2,018	316
2005	6.4	13.2	19.6	1,942	305
2006	6.4	13.2	19.6	1,869	294
2007	6.4	13.2	19.6	1,798	283
2008	6.4	13.2	19.6	1,713	273
2009	6.4	13.2	19.6	1,630	263
2010	6.4	13.2	19.6	1,554	254
2011	6.4	13.2	19.6	1,481	245
2012	6.4	13.2	19.6	1,413	236
2013	6.4	13.2	19.6	1,347	228
2014	6.4	13.2	19.6	1,284	219
2015	6.4	13.2	19.6	1,225	212
2016	6.4	13.2	19.6	1,170	204
2017	6.4	13.2	19.6	1,117	197
2018	6.4	13.2	19.6	1,068	190
2019	6.4	13.2	19.6	1,025	183
2020	6.4	13.2	19.6	986	176
2021	6.4	13.2	19.6	949	170
2022	6.4	13.2	19.6	913	164
2023	6.4	13.2	19.6	878	158
2024	6.4	13.2	19.6	845	152
2025	6.4	13.2	19.6	813	147

SOURCE: Congressional Budget Office.

TABLE B-9. OPTION I ASSUMING LOW SWU DEMAND

Year	Annual SWU Production (In millions of SWUs)				Discounted Enterprise Costs (In millions of 1983 dollars)	Discounted Federal Outlays
	Gaseous Diffusion	GCEP	AVLIS	Total		
1983	11.5	0.0	0.0	11.5	3,423	2,080
1984	13.3	0.0	0.0	13.3	3,971	2,375
1985	15.9	0.0	0.0	15.9	4,586	2,500
1986	13.8	0.0	0.0	13.8	3,970	2,229
1987	17.5	0.0	0.0	17.5	4,656	2,362
1988	17.3	0.4	0.0	17.6	4,523	2,268
1989	17.0	1.1	0.0	18.1	4,461	2,197
1990	17.4	3.1	0.0	20.5	4,569	2,064
1991	16.3	5.2	0.0	21.5	4,413	1,811
1992	13.2	7.3	0.0	20.5	1,791	1,939
1993	8.7	9.6	0.0	18.3	1,019	1,078
1994	6.3	11.7	0.9	18.9	1,225	1,124
1995	0.0	13.0	6.0	19.0	3,063	754
1996	0.0	13.1	5.6	18.7	2,493	222
1997	0.0	13.2	5.2	18.4	2,361	209
1998	0.0	13.2	5.6	18.8	2,314	206
1999	0.0	13.2	4.9	18.1	2,151	189
2000	0.0	13.2	4.9	18.1	2,068	182
2001	0.0	13.2	6.4	19.6	2,131	191
2002	0.0	13.2	6.4	19.6	2,050	184
2003	0.0	13.2	6.4	19.6	1,971	177
2004	0.0	13.2	6.4	19.6	1,895	170
2005	0.0	13.2	6.4	19.6	1,822	163
2006	0.0	13.2	6.4	19.6	1,752	157
2007	0.0	13.2	6.4	19.6	1,684	151
2008	0.0	13.2	6.4	19.6	1,602	145
2009	0.0	13.2	6.4	19.6	1,523	140
2010	0.0	13.2	6.4	19.6	1,449	134
2011	0.0	13.2	6.4	19.6	1,379	129
2012	0.0	13.2	6.4	19.6	1,314	124
2013	0.0	13.2	6.4	19.6	1,251	119
2014	0.0	13.2	6.4	19.6	1,191	115
2015	0.0	13.2	6.4	19.6	1,133	110
2016	0.0	13.2	6.4	19.6	1,079	106
2017	0.0	13.2	6.4	19.6	1,027	102
2018	0.0	13.2	6.4	19.6	978	98
2019	0.0	13.2	6.4	19.6	936	94
2020	0.0	13.2	6.4	19.6	898	91
2021	0.0	13.2	6.4	19.6	863	87
2022	0.0	13.2	6.4	19.6	830	84
2023	0.0	13.2	6.4	19.6	798	81
2024	0.0	13.2	6.4	19.6	767	77
2025	0.0	13.2	6.4	19.6	738	75

SOURCE: Congressional Budget Office.

TABLE B-10. OPTION II ASSUMING LOW SWU DEMAND

Year	Annual SWU Production (In millions of SWUs)			Total	Discounted Enterprise Costs (In millions of 1983 dollars)	Discounted Federal Outlays
	Gaseous Diffusion	GCEP	AVLIS			
1983	11.5	0.0	0.0	11.5	3,421	2,078
1984	13.3	0.0	0.0	13.3	3,969	2,352
1985	15.9	0.0	0.0	15.9	4,582	2,453
1986	13.8	0.0	0.0	13.8	3,955	2,062
1987	17.5	0.0	0.0	17.5	4,625	2,099
1988	17.3	0.4	0.0	17.6	4,469	1,907
1989	17.0	1.1	0.0	18.1	4,362	1,749
1990	18.2	2.3	0.0	20.5	4,468	1,646
1991	19.1	2.4	0.0	21.5	4,386	1,607
1992	17.9	2.6	0.0	20.5	4,019	1,518
1993	15.5	2.8	0.0	18.3	3,903	1,786
1994	14.9	2.9	0.9	18.7	3,335	1,260
1995	8.6	3.1	7.2	18.9	2,974	936
1996	1.0	3.3	15.3	19.6	3,058	897
1997	0.0	3.3	15.1	18.4	2,723	671
1998	0.0	3.3	15.5	18.8	2,279	262
1999	0.0	3.3	14.8	18.1	2,117	243
2000	0.0	3.3	14.8	18.1	2,036	234
2001	0.0	3.3	16.3	19.6	2,100	241
2002	0.0	3.3	16.3	19.6	2,019	231
2003	0.0	3.3	16.3	19.6	1,942	223
2004	0.0	3.3	16.3	19.6	1,867	214
2005	0.0	3.3	16.3	19.6	1,795	206
2006	0.0	3.3	16.3	19.6	1,726	198
2007	0.0	3.3	16.3	19.6	1,660	190
2008	0.0	3.3	16.3	19.6	1,578	183
2009	0.0	3.3	16.3	19.6	1,501	176
2010	0.0	3.3	16.3	19.6	1,429	169
2011	0.0	3.3	16.3	19.6	1,364	163
2012	0.0	3.3	16.3	19.6	1,305	156
2013	0.0	3.3	16.3	19.6	1,251	150
2014	0.0	3.3	16.3	19.6	1,201	145
2015	0.0	3.3	16.3	19.6	1,154	139
2016	0.0	3.3	16.3	19.6	1,106	134
2017	0.0	3.3	16.3	19.6	1,058	129
2018	0.0	3.3	16.3	19.6	1,012	124
2019	0.0	3.3	16.3	19.6	967	119
2020	0.0	3.3	16.3	19.6	924	114
2021	0.0	3.3	16.3	19.6	886	110
2022	0.0	3.3	16.3	19.6	852	106
2023	0.0	3.3	16.3	19.6	819	102
2024	0.0	3.3	16.3	19.6	788	98
2025	0.0	3.3	16.3	19.6	757	94

SOURCE: Congressional Budget Office.

TABLE B-11. OPTION III ASSUMING LOW SWU DEMAND

Year	Annual SWU Production (In millions of SWUs)			Discounted Enterprise Costs (In millions of 1983 dollars)	Discounted Federal Outlays
	Gaseous Diffusion	AVLIS	Total		
1983	11.5	0.0	11.5	3,894	1,989
1984	13.3	0.0	13.3	4,177	2,056
1985	15.9	0.0	15.9	4,631	2,098
1986	13.8	0.0	13.8	3,895	1,759
1987	17.5	0.0	17.5	4,362	1,720
1988	17.6	0.0	17.6	4,227	1,671
1989	18.1	0.0	18.1	4,138	1,613
1990	20.5	0.0	20.5	4,328	1,636
1991	21.5	0.0	21.5	4,329	1,685
1992	20.5	0.0	20.5	3,970	1,616
1993	18.3	0.0	18.3	3,400	1,435
1994	17.8	0.9	18.7	3,344	1,420
1995	11.7	7.2	18.9	3,364	1,474
1996	3.0	16.2	19.2	2,916	931
1997	0.0	18.4	18.4	2,605	660
1998	0.0	18.8	18.8	2,166	230
1999	0.0	18.1	18.1	2,008	213
2000	0.0	18.1	18.1	1,931	204
2001	0.0	19.6	19.6	1,999	212
2002	0.0	19.6	19.6	1,922	204
2003	0.0	19.6	19.6	1,848	196
2004	0.0	19.6	19.6	1,777	189
2005	0.0	19.6	19.6	1,708	181
2006	0.0	19.6	19.6	1,643	175
2007	0.0	19.6	19.6	1,580	168
2008	0.0	19.6	19.6	1,516	161
2009	0.0	19.6	19.6	1,454	155
2010	0.0	19.6	19.6	1,307	149
2011	0.0	19.6	19.6	1,342	143
2012	0.0	19.6	19.6	1,289	138
2013	0.0	19.6	19.6	1,239	133
2014	0.0	19.6	19.6	1,191	128
2015	0.0	19.6	19.6	1,144	123
2016	0.0	19.6	19.6	1,096	118
2017	0.0	19.6	19.6	1,048	113
2018	0.0	19.6	19.6	1,001	109
2019	0.0	19.6	19.6	955	912
2020	0.0	19.6	19.6	105	101
2021	0.0	19.6	19.6	873	97
2022	0.0	19.6	19.6	839	93
2023	0.0	19.6	19.6	807	90
2024	0.0	19.6	19.6	776	86
2025	0.0	19.6	19.6	746	83

SOURCE: Congressional Budget Office.

TABLE B-12. OPTION IV ASSUMING LOW SWU DEMAND

Year	Annual SWU Production (In millions of SWUs)			Discounted Enterprise Costs (In millions of 1983 dollars)	Discounted Federal Outlays
	Gaseous Diffusion	AGC	Total		
1983	11.5	0.0	11.5	3,388	2,045
1984	13.3	0.0	13.3	3,898	2,302
1985	15.9	0.0	15.9	4,494	2,408
1986	13.8	0.0	13.8	3,863	2,122
1987	17.5	0.0	17.5	4,586	2,308
1988	17.3	0.4	17.6	4,489	2,257
1989	17.0	1.1	18.1	4,421	2,114
1990	17.0	3.5	20.5	4,532	1,965
1991	15.2	6.3	21.5	4,343	1,665
1992	10.9	9.6	20.5	4,152	1,520
1993	5.5	12.8	18.3	3,335	920
1994	4.1	14.6	18.7	2,760	390
1995	3.2	15.7	18.9	2,635	336
1996	2.3	16.9	19.1	2,532	287
1997	0.0	18.1	18.1	2,602	539
1998	0.0	19.0	19.0	2,206	130
1999	0.0	18.1	18.1	2,036	125
2000	0.0	18.1	18.1	1,958	120
2001	0.0	19.6	19.6	2,009	116
2002	0.0	19.6	19.6	1,932	111
2003	0.0	19.6	19.6	1,857	107
2004	0.0	19.6	19.6	1,786	103
2005	0.0	19.6	19.6	1,717	99
2006	0.0	19.6	19.6	1,651	95
2007	0.0	19.6	19.6	1,588	91
2008	0.0	19.6	19.6	1,509	88
2009	0.0	19.6	19.6	1,433	84
2010	0.0	19.6	19.6	1,363	81
2011	0.0	19.6	19.6	1,297	78
2012	0.0	19.6	19.6	1,234	75
2013	0.0	19.6	19.6	1,173	72
2014	0.0	19.6	19.6	1,117	69
2015	0.0	19.6	19.6	1,064	67
2016	0.0	19.6	19.6	1,015	971
2017	0.0	19.6	19.6	971	62
2018	0.0	19.6	19.6	933	59
2019	0.0	19.6	19.6	897	57
2020	0.0	19.6	19.6	862	55
2021	0.0	19.6	19.6	829	53
2022	0.0	19.6	19.6	797	51
2023	0.0	19.6	19.6	766	49
2024	0.0	19.6	19.6	736	47
2025	0.0	19.6	19.6	708	45

SOURCE: Congressional Budget Office.

## ANALYSIS RESULTS ASSUMING A LOW TAILS ASSAY

An operating tails assay represents the concentration of the U-235 isotope remaining in the depleted waste stream (tails) after the uranium feedstock undergoes the enrichment process. For a given amount of enriched product, there is a trade-off between the operating tails assay and uranium feedstock requirements: a high tails assay (0.25 percent, for example) would leave a higher U-235 concentration in the depleted tails and would thus require more feed to equal the enriched uranium product produced under a low tails assay (such as 0.10 percent). On the other hand, a high tails assay would require less energy (SWUs) than a low tails assay, since the feedstock is enriched to a lesser degree. (The feed does not pass through so many enrichment stages, since more of the U-235 isotope is left in the tails.)

To produce a desired amount of enriched product, there are two options:

- o Operate under a lower tails assay, using less feed but more energy, or
- o Operate under a higher tails assay, using more feed but fewer separative work units (SWUs).

The optimal tails assay, in terms of minimizing total enterprise costs, depends on both natural uranium feed costs and enrichment processing costs that reflect the efficiencies of the different technologies.

The enrichment program recommended in DOE's January 1983 operating plan (the Base/DOE Plan) is based on an analysis that assumes an operating tails assay of 0.20 percent through 1999, and 0.25 percent thereafter. Raising the tails assay in the year 2000 reduces SWU production requirements from the energy-intensive gaseous diffusion plants; this would allow one gaseous diffusion plant to be shut down permanently, while the other two would continue to operate along with the full GCEP facility. All four option costs presented in the Chapter IV analysis were based on this same tails assay schedule, to enable consistent comparisons to be made with the Base/DOE Plan.

The more advanced technologies, however, are designed to operate more efficiently (and less expensively) than either the gaseous diffusion or the Sets III/IV gas centrifuge processes, suggesting that it would be more cost-effective from the customers' standpoint to operate these under a low tails assay. Doing so would take advantage of the increased efficiencies of the AGC and AVLIS technologies by increasing SWU production and cutting

down on feedstock requirements. This section considers two enrichment programs that would use AGC and/or AVLIS, operating under a tails assay of 0.20 percent from 1983 to 1999 and 0.10 percent from 2000 to 2025. Discussion of the two options and their cost projections and comparisons follow.

#### Alternative Enrichment Programs Under Low Tails Assay

The two program options considered here are designed to meet the same enriched uranium fuel levels produced under the initial analysis' medium-SWU-demand projections. The low tails rate assumption from 2000 on, however, results in greater SWU but lower feed requirements in these later years, so the two options must provide greater SWU capacities than the Chapter IV options.

Option A--Eliminate GCEP, Build AVLIS. This option is similar to the AVLIS program in Option III, but it provides a maximum annual capacity of 42 million SWUs rather than 26.5 million. Five AVLIS plants would be built, with production beginning in 1994 as in Option III. The gaseous diffusion plants would provide all SWU requirements until then, and the GCEP facility would be halted at the end of fiscal year 1983. All three gaseous diffusion plants would be decommissioned by 1998.

Option B--Build AGC and AVLIS. This option would proceed with the AGC implementation schedule assumed in Option IV. The AGC facility would provide a maximum capacity of 26.5 million SWUs a year and, to provide the remaining 15.5 million SWUs a year required under the low tails assay, two AVLIS plants would be built. The first AVLIS plant would begin production in 1995, the second in 2000. The AGC facility would operate at its maximum capacity rate of 26.5 million SWUs from 1999 through 2025, and the AVLIS plants would provide another 15.5 million SWUs from 2000 on; the three gaseous diffusion plants would be phased out entirely by 1996.

Aside from the tails assay, the assumptions used to project the costs of the above programs are consistent with those in the base case analysis: a real annual discount rate of 4 percent, a real power escalation rate of 0.5 percent, and a real capital recovery rate of 4 percent applied to new capital charges (fully discounted over 25 years) when calculating enterprise and total SWU costs and enrichment charges. The results of the analysis are discussed below.

## Option Cost Comparisons Under a Low Tails Assay

The projected costs of these programs are summarized in Table B-13. The analysis suggests that, of the two options, the program using both the AGC and AVLIS facilities (Option B) would be most cost effective in terms of both enterprise costs and outlays over the period 1983 to 2025. The enterprise costs of Option B would be \$2.9 billion cheaper than Option A (\$117.7 billion, compared to \$120.6 billion), and the enrichment charge would be \$2.10 per SWU lower. <sup>1/</sup>

A more important comparison can be made between Option B and Option IV, the least-cost option presented in the initial analysis. The total enterprise costs of Option B through 2025 would be \$5.8 billion less than those of Option IV--\$117.7 billion compared to \$123.5 billion (see Table 8 in Chapter IV). The cost per SWU and enrichment charge are also projected to be cheaper under the Option B program, although more SWUs must be purchased under the low tails assay Option B. Still, the projected lower total enterprise cost suggests that, from the customers' standpoint, which total feed cost is an important factor, the most cost-effective strategy would include both the AGC and AVLIS processes, operated under a low tails assay, once the gaseous diffusion plants are phased out of production.

On the other hand, the government outlays required under Option B would be \$3.6 billion greater than the Option IV outlay requirements through 2025. These higher outlays represent the capital costs of building the additional capacity required under the low tails assay assumption. Total feed costs, which are greatly reduced under the low tails assay, are not included in outlays; thus these savings are represented only in enterprise and SWU costs, not in outlays.

This trade-off of higher outlays and lower enterprise and SWU costs between different programs is an important issue the DOE faces when determining the operating tails assay. This analysis suggests that the total costs to the customer, represented by the total enterprise costs, would be 5 percent lower over the period 1983 to 2025 under Option B, compared to

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1. A program designed to meet the low tails assay SWU requirements based on only the AGC technology was also examined. An additional 15.5 million SWU capacity would be required, an increase of almost 60 percent in the productive capacity of the currently proposed eight-building GCEP/AGC facility. The incremental capital costs associated with the larger AGC capacity would have to be under 50 percent of the current cost projections for the eight-building GCEP/AGC facility for this program to be more cost effective than Option B.

TABLE B-13. COST OF ALTERNATIVE ENRICHMENT PROGRAMS  
ASSUMING A TAILS ASSAY OF 0.10 PERCENT,  
FROM 2000-2025

	Option A	Option B
<b>Discounted Enterprise Costs in Billions of 1983 Dollars</b>		
Gaseous Diffusion	58.2	43.2
Gas Centrifuge	1.4	54.4
AVLIS	61.0	20.1
<b>Full-Period Total</b>	<b>120.6</b>	<b>117.7</b>
1983-2003 Total	84.3	82.1
<b>Discounted Federal Outlays in Billions of 1983 Dollars</b>		
1983-1990	15.2	18.9
1991-2000	14.1	8.7
2001-2025	5.5	4.0
<b>Full-Period Total</b>	<b>34.8</b>	<b>31.6</b>
<b>Costs per SWU in 1983 Dollars</b>		
Full-Period Fuel Cost	82.7	80.6
Full-Period Enrichment Charge	24.0	21.9

SOURCE: Congressional Budget Office.

NOTE: Cumulative SWU production for each option is 1,460 million SWUs. From 1983 to 1999, all technologies operate under a tails assay of 0.2 percent, as in the initial analysis. From 2000 to 2025, all technologies would operate under a tails assay of 0.1 percent. All other assumptions are the same as those applied in Table 8.

Option IV in the initial analysis. However, looking at budgetary expenditures, the Option B program would appear less favorable than Option I, since its outlay requirements would be 13 percent higher owing to the larger capacity needs.

For any period, the optimal tails assay depends on the uranium feed costs, energy prices, and efficiencies of the technologies in use. A new model currently being developed at the Oak Ridge Laboratory to analyze the DOE uranium enrichment program using the different technologies is designed to determine the optimal tails assay for minimizing program costs. While the gaseous diffusion plants are in operation through most of the remainder of this century, the DOE will most likely continue to operate using a tails assay of 0.20 percent. After that, however, the DOE may find it cost effective to lower the operating tails assay, depending on whether and when the AGC and AVLIS technologies are brought on-line for commercial production, and on the future prices of uranium feedstock.





