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ECONOMIC ASSESSMENT OF ADVANCED FLUE GAS
DESULFURIZATION PROCESSES

Final Report—Volume 2, Appendices G, H, and I

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Science Applications, Inc.
McLean, Virginia

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UNITED STATES DEPARTMENT OF ENERGY

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APPENDIX G

FGD PROCESS COST COMPARISONS

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TABLE G-1. 1 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: ECAR PLANT SIZE: 500 MW COAL: 3.65 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	3539	4426	3431	1316	1418	1632	3812
GAS HANDLING	6529	6529	6410	6984	7093	7582	7577
CHLORIDE PURGE	---	---	---	6132	3198	---	---
SO2 ABSORPTION	12801	13500	13933	8240	12623	14425	20823
STACK GAS REHEAT	1940	1931	1931	1810	1782	---	---
REGENERATION	---	---	465	11485	12888	12482	---
SLUDGE DISPOSAL	1969	2057	4656	---	---	---	1117
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9361	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	12039	4840	---
ESP CREDIT	---	---	---	---	---	---	(10482)
SERVICES, UTILITIES, MISC.	1607	1707	1849	2720	3062	2458	1371
SLUDGE POND	4742	3453	4338	---	338	---	282
TOTAL DIRECT INVESTMENT	33127	35603	37013	48046	54441	43418	24498
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2981	3204	3331	4324	4900	3908	2205
CONSTRUCTION EXPENSE	5300	5696	5922	7687	8711	6947	3920
CONTRACTOR FEES	1656	1780	1851	2402	2722	2171	1225
CONTINGENCY	8613	9257	9623	12492	14155	14111	9395
ALLOWANCE FOR SHAKEDOWN	4694	5009	5340	7495	8459	6773	3794
INTEREST DURING CONSTRUCTION	8599	9242	9608	12472	14132	11271	6359
LAND	1995	2425	1986	64	64	64	1723
WORKING CAPITAL	695	435	661	893	560	660	647
TOTAL CAPITAL INVESTMENT	67661	72650	75335	95877	108144	89322	53766

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 2 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: ECAR		PLANT SIZE: 500 MW		COAL: 3.65 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	5744	---	5470	---	---	---	6325
-LIMESTONE	---	2304	---	412	---	---	---
-SODA ASH	---	---	417	---	1171	1706	---
-MAGNESIUM OXIDE	---	---	---	447	---	---	---
-COAL	---	---	---	---	---	2063	---
-CATALYST	---	---	---	6	---	21	---
UTILITIES							
-ELECTRICITY	1512	1762	966	2094	1558	2189	1445
-WATER	33	34	33	364	744	366	11
-STEAM	1083	1151	1084	1114	3494	---	---
-FUEL OIL	---	---	---	7014	---	2794	---
-NATURAL GAS	---	---	---	---	562	---	---
-HEAT CREDIT	---	---	---	(362)	(58)	(850)	---
TOTAL VARIABLE O&M COST	8372	5251	7970	11090	7472	8289	7781
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	10
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	383	383	509	733	725	788	383
MAINTENANCE							
-LABOR & MATERIAL	2409	2571	1436	3355	3788	3014	1458
TOTAL FIXED O&M COST	2792	2954	1945	4088	4512	3802	1851
OVERHEAD							
-PLANT	1396	1477	972	2044	2256	1901	926
-ADMINISTRATIVE	38	38	51	73	72	79	38
-MARKETING	---	---	---	508	351	371	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5075)	---	---	---
-SULFUR	---	---	---	---	(3514)	(3712)	---
NET OPERATING COST	12599	9721	10938	12727	11150	10730	10596
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.48	3.73	3.87	4.93	5.56	4.59	2.76
-LEVELIZED OPERATING COST (MILL/KWH)	6.78	5.23	5.89	6.85	6.00	5.78	5.70
TOTAL LEVELIZED COST (MILL/KWH)	10.26	8.96	9.76	11.78	11.56	10.36	8.47

TABLE G-1. 3 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: ECAR

PLANT SIZE: 500 MW

COAL: 1.20 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1374	2108	1293	564	540	622	1507
GAS HANDLING	6756	6758	6629	7223	7336	7842	7841
CHLORIDE PURGE	---	---	---	6346	3310	---	---
SO2 ABSORPTION	13222	13945	14423	8529	13065	14930	21506
STACK GAS REHEAT	2008	1995	1995	1872	1844	---	---
REGENERATION	---	---	207	5288	5939	5751	---
SLUDGE DISPOSAL	1256	1312	2136	---	---	---	494
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3679	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4649	1869	---
ESP CREDIT	---	---	---	---	---	---	(10791)
SERVICES, UTILITIES, MISC	1477	1567	1601	2010	2201	1861	1233
SLUDGE POND	1778	2009	1679	---	350	---	292
TOTAL DIRECT INVESTMENT	27872	29693	29963	35510	39233	32875	22082
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2508	2672	2697	3196	3531	2959	1987
CONSTRUCTION EXPENSE	4459	4751	4794	5682	6277	5260	3533
CONTRACTOR FEES	1394	1485	1498	1775	1962	1644	1104
CONTINGENCY	7247	7720	7790	9233	10201	10684	7464
ALLOWANCE FOR SHAKEDOWN	4170	4431	4506	5540	6085	5128	3416
INTEREST DURING CONSTRUCTION	7235	7708	7778	9218	10184	8534	5732
LAND	542	653	540	64	64	64	882
WORKING CAPITAL	343	285	290	421	534	312	260
TOTAL CAPITAL INVESTMENT	55770	59398	59857	70638	78071	67460	46460

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 4 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: ECAR		PLANT SIZE: 500 MW		COAL: 1.20 % SULFUR		
	LIME	LIPESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	1475	---	1405	---	---	---	1625
-LIMESTONE	---	592	---	412	---	---	---
-SODA ASH	---	---	107	---	1118	438	---
-MAGNESIUM OXIDE	---	---	---	115	---	---	---
-COAL	---	---	---	---	---	530	---
-CATALYST	---	---	---	2	---	5	---
UTILITIES							
-ELECTRICITY	1518	1712	840	1659	1560	2270	1498
-WATER	26	27	30	139	530	297	9
-STEAM	1123	1112	1124	1155	3623	---	---
-FUEL OIL	---	---	---	1801	---	718	---
-NATURAL GAS	---	---	---	---	122	---	---
-HEAT CREDIT	---	---	---	(93)	(13)	(218)	---
9 TOTAL VARIABLE O&M COST	4143	3442	3507	5189	942	4039	3132
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	5
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	327	327	436	626	619	672	327
MAINTENANCE							
-LABOR & MATERIAL	2137	2271	1180	2479	2725	2282	1313
TOTAL FIXED O&M COST	2464	2597	1616	3106	3344	2954	1645
OVERHEAD							
-PLANT	1232	1299	808	1553	1672	1477	822
-ADMINISTRATIVE	33	33	44	63	62	67	33
-MARKETING	---	---	---	130	76	95	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1304)	---	---	---
-SULFUR	---	---	---	---	(764)	(953)	---
NET OPERATING COST	7871	7371	5974	8737	11332	7679	5631
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	2.86	3.05	3.07	3.63	4.01	3.47	2.39
-LEVELIZED OPERATING COST (MILL/KWH)	4.24	3.97	3.22	4.70	6.10	4.13	3.03
TOTAL LEVELIZED COST (MILL/KWH)	7.10	7.02	6.29	8.33	10.11	7.60	5.42

TABLE B-1. 5 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: ECAR PLANT SIZE: 100 MW COAL: 3.65 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1204	1902	1129	501	472	543	1323
GAS HANDLING	1813	1802	1825	1987	2018	2158	2103
CHLORIDE PURGE	---	---	---	1418	740	---	---
SO2 ABSORPTION	3846	4055	3813	2260	3472	3967	6285
STACK GAS REHEAT	538	566	566	509	498	---	---
REGENERATION	---	---	184	4741	5325	5157	---
SLUDGE DISPOSAL	1179	1232	1914	---	---	---	440
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3225	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4066	1635	---
ESP CREDIT	---	---	---	---	---	---	(3032)
SERVICES, UTILITIES, MISC	515	573	566	878	995	808	427
SLUDGE POND	1545	1742	1466	---	72	---	60
TOTAL DIRECT INVESTMENT	10641	11872	11463	15520	17657	14267	7608
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	958	1068	1032	1397	1589	1284	685
CONSTRUCTION EXPENSE	1703	1900	1834	2483	2825	2283	1217
CONTRACTOR FEES	532	594	573	776	883	713	380
CONTINGENCY	2767	3087	2980	4035	4591	4637	2918
ALLOWANCE FOR SHAKEDOWN	1505	1678	1642	2421	2747	2226	1181
INTEREST DURING CONSTRUCTION	2762	3082	2976	4029	4583	3703	1975
LAND	455	546	453	64	64	64	397
WORKING CAPITAL	150	92	140	190	190	140	137
TOTAL CAPITAL INVESTMENT	21472	23918	23093	30916	35130	29316	16498

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 6. ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW REGION: ECAR PLANT SIZE: 100 MW COAL: 3.65 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	1218	---	1160	---	---	---	1342
-LIMESTONE	---	489	---	88	---	---	---
-SODA ASH	---	---	88	---	1111	362	---
-MAGNESIUM OXIDE	---	---	---	95	---	---	---
-COAL	---	---	---	---	---	437	---
-CATALYST	---	---	---	1	---	4	---
UTILITIES							
-ELECTRICITY	348	385	205	454	340	464	306
-WATER	7	7	7	78	161	78	2
-STEAM	230	228	230	234	741	---	---
-FUEL OIL	---	---	---	1488	---	593	---
-NATURAL GAS	---	---	---	---	96	---	---
-HEAT CREDIT	---	---	---	(77)	(10)	(180)	---
∞ TOTAL VARIABLE O&M COST	1803	1108	1690	2362	2439	1758	1650
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	2
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	182	182	252	345	341	373	182
MAINTENANCE							
-LABOR & MATERIAL	940	1048	635	1371	1555	1253	594
TOTAL FIXED O&M COST	1123	1230	888	1716	1896	1625	778
OVERHEAD							
-PLANT	561	615	444	858	948	813	389
-ADMINISTRATIVE	18	18	25	34	34	37	18
-MARKETING	---	---	---	108	60	79	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1076)	---	---	---
-SULFUR	---	---	---	---	(599)	(787)	---
NET OPERATING COST	3505	2972	3047	4001	4779	3525	2836
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.52	6.14	5.93	7.94	9.02	7.53	4.24
-LEVELIZED OPERATING COST (MILL/KWH)	9.43	8.00	8.20	10.77	12.86	9.49	7.63
TOTAL LEVELIZED COST (MILL/KWH)	14.95	14.14	14.13	18.71	21.88	17.02	11.87

TABLE G-1. 7 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: ECAR		PLANT SIZE: 100 MW		COAL: 1.20 % SULFUR	
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	476	927	433	216	180	207	530
GAS HANDLING	1876	1863	1887	2055	2088	2231	2177
CHLORIDE PURGE	---	---	---	1468	766	---	---
SO2 ABSORPTION	3973	4189	3948	2340	3593	4106	6492
STACK GAS REHEAT	557	585	585	527	515	---	---
REGENERATION	---	---	82	2183	2454	2376	---
SLUDGE DISPOSAL	752	786	878	---	---	---	195
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1267	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1570	631	---
ESP CREDIT	---	---	---	---	---	---	(3121)
SERVICES, UTILITIES, MISC	458	501	469	603	670	573	376
SLUDGE POND	565	626	549	---	74	---	62
TOTAL DIRECT INVESTMENT	8656	9479	8831	10658	11909	10125	6711
INDIRECT INVESTMENT							
6 ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	779	853	795	959	1072	911	604
CONSTRUCTION EXPENSE	1385	1517	1413	1705	1905	1620	1074
CONTRACTOR FEES	433	474	442	533	595	506	336
CONTINGENCY	2251	2465	2296	2771	3096	3291	2268
ALLOWANCE FOR SHAKEDOWN	1294	1416	1323	1663	1850	1579	1041
INTEREST DURING CONSTRUCTION	2247	2461	2293	2767	3091	2628	1742
LAND	147	170	146	64	64	64	219
WORKING CAPITAL	75	60	61	90	181	66	55
TOTAL CAPITAL INVESTMENT	17266	18894	17600	21211	23765	20791	14049

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. B ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: ECAR		PLANT SIZE: 100 MW		COAL: 1.20 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST								
(VARIABLE)								
RAW MATERIAL								
-LIME	313	---	298	---	---	---	---	345
-LIMESTONE	---	125	---	88	---	---	---	---
-SODA ASH	---	---	23	---	1061	---	93	---
-MAGNESIUM OXIDE	---	---	---	24	---	---	---	---
-COAL	---	---	---	---	---	---	112	---
-CATALYST	---	---	---	0	---	---	1	---
UTILITIES								
-ELECTRICITY	350	374	178	362	341	481	318	
-WATER	6	6	6	30	116	63	2	
-STEAM	238	219	238	245	768	---	---	
-FUEL OIL	---	---	---	382	---	152	---	
-NATURAL GAS	---	---	---	---	4	---	---	
-HEAT CREDIT	---	---	---	(20)	(0)	(46)	---	
TOTAL VARIABLE O&M COST		907	724	744	1111	2289	857	664
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	1
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	126	126	179	238	235	256	126	
MAINTENANCE								
-LABOR & MATERIAL	812	889	506	941	1047	889	523	
TOTAL FIXED O&M COST		938	1015	685	1179	1283	1145	650
OVERHEAD								
-PLANT	469	507	343	590	641	573	325	
-ADMINISTRATIVE	13	13	18	24	24	26	13	
-MARKETING	---	---	---	28	2	20	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(276)	---	---	---	
-SULFUR	---	---	---	---	(23)	(202)	---	
NET OPERATING COST		2326	2258	1790	2655	4217	2418	1652
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	4.43	4.85	4.52	5.45	6.10	5.34	3.61	
-LEVELIZED OPERATING COST (MILL/KWH)	6.26	6.08	4.82	7.15	11.35	6.51	4.45	
TOTAL LEVELIZED COST (MILL/KWH)		10.70	10.93	9.34	12.59	17.45	11.85	8.05

TABLE G-1. 9 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: ERCOT	PLANT SIZE: 500 MW	COAL: 1.00 % SULFUR				
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	770	1345	712	334	297	342	852
GAS HANDLING	9232	9247	9011	9819	9972	10660	10715
CHLORIDE PURGE	---	---	---	8673	4523	---	---
SO ₂ ABSORPTION	17767	18739	19770	11685	17891	20445	28870
STACK GAS REHEAT	2745	2695	2695	2551	2516	---	---
REGENERATION	---	---	125	3269	3673	3557	---
SLUDGE DISPOSAL	950	993	1318	---	---	---	298
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2061	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2577	1036	---
ESP CREDIT	---	---	---	---	---	---	14061
SERVICES, UTILITIES, MISC	1888	1981	2018	2304	2487	2162	1600
SLUDGE POND	956	1069	918	---	488	---	406
TOTAL DIRECT INVESTMENT	34308	36068	36566	40696	44423	38202	28682
INDIRECT INVESTMENT							
11 ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3088	3246	3291	3663	3998	3438	2581
CONSTRUCTION EXPENSE	5489	5771	5851	6511	7108	6112	4589
CONTRACTOR FEES	1715	1803	1828	2035	2221	1910	1434
CONTINGENCY	8920	9378	9507	10581	11550	12416	9588
ALLOWANCE FOR SHUTDOWN	5256	5520	5612	6349	6881	5959	4434
INTEREST DURING CONSTRUCTION	8906	9363	9492	10564	11532	9917	7445
LAND	55	65	54	14	14	14	226
WORKING CAPITAL	356	356	279	415	696	309	233
TOTAL CAPITAL INVESTMENT	68093	71569	72480	80826	88423	78277	59212

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 10 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: ERCOT		PLANT SIZE: 500 MW		COAL: 1.00 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	645	---	614	---	---	---	710
-LIMESTONE	---	394	---	418	---	---	---
-SODA ASH	---	---	46	---	1095	190	---
-MAGNESIUM OXIDE	---	---	---	46	---	---	---
-COAL	---	---	---	---	---	134	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	2061	2332	1119	2133	2141	3160	2086
-WATER	34	34	41	117	657	404	12
-STEAM	1563	1547	1565	1608	5044	---	---
-FUEL OIL	---	---	---	812	---	324	---
-NATURAL GAS	---	---	---	---	81	---	---
-HEAT CREDIT	---	---	---	(40)	(4)	(94)	---
TOTAL VARIABLE O&M COST	4304	4306	3386	5095	9016	4119	2808
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	6
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	322	322	430	617	610	662	322
MAINTENANCE							
-LABOR & MATERIAL	2692	2827	1452	2841	3082	2652	1704
TOTAL FIXED O&M COST	3014	3149	1881	3459	3692	3314	2033
OVERHEAD							
-PLANT	1507	1574	941	1729	1846	1657	1016
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	56	23	41	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(561)	---	---	---
-SULFUR	---	---	---	---	(227)	410)	---
NET OPERATING COST	8857	9062	6251	9840	14412	8787	5889
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL./KWH)	3.50	3.68	3.72	4.15	4.54	4.02	3.04
-LEVELIZED OPERATING COST (MILL./KWH)	4.77	4.88	3.36	5.30	7.76	4.73	3.17
TOTAL LEVELIZED COST (MILL./KWH)	8.26	8.55	7.09	9.45	12.30	8.75	6.21

TABLE G-1. 11 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: ERCOT		PLANT SIZE: 500 MW		COAL: 0.75 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1375	2109	1294	564	540	622	1508
GAS HANDLING	8633	8645	8436	9192	9336	9979	10020
CHLORIDE PURGE	---	---	---	8110	4229	---	---
SO2 ABSORPTION	16675	17586	18475	10921	16723	19110	27101
STACK GAS REHEAT	2566	2526	2526	2387	2354	---	---
REGENERATION	---	---	207	5290	3942	5754	---
SLUDGE DISPOSAL	1256	1313	2137	---	---	---	494
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3681	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4652	1870	---
ESP CREDIT	---	---	---	---	---	---	(13284)
SERVICES, UTILITIES, MISC	1830	1931	1985	2409	2627	2240	1550
SLUDGE POND	1779	2010	1680	---	454	---	379
TOTAL DIRECT INVESTMENT	34115	36119	36740	42554	46856	39576	27768
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3070	3251	3307	3830	4217	3562	2499
CONSTRUCTION EXPENSE	5458	5779	5878	6809	7497	6332	4443
CONTRACTOR FEES	1706	1806	1837	2128	2343	1979	1388
CONTINGENCY	8870	9391	9552	11064	12183	12862	9153
ALLOWANCE FOR SHAKEDOWN	5144	5434	5563	6638	7264	6174	4294
INTEREST DURING CONSTRUCTION	8856	9376	9537	11046	12163	10273	7208
LAND	116	139	115	14	14	14	240
WORKING CAPITAL	408	380	339	492	674	353	299
TOTAL CAPITAL INVESTMENT	67743	71675	72869	84576	93210	81124	57292

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 12 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: ERCOT		PLANT SIZE: 500 MW		COAL: 0.75 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							

(VARIABLE)							
RAW MATERIAL							
-LIME	1500	---	1428	---	---	---	1651
-LIMESTONE	---	915	---	418	---	---	---
-SODA ASH	---	---	108	---	1127	442	---
-MAGNESIUM OXIDE	---	---	---	107	---	---	---
-COAL	---	---	---	---	---	311	---
-CATALYST	---	---	---	2	---	3	---
UTILITIES							
-ELECTRICITY	1936	2198	1074	2091	2008	2943	1943
-WATER	33	34	39	156	661	365	11
-STEAM	1456	1452	1457	1498	4698	---	---
-FUEL OIL	---	---	---	1889	---	752	---
-NATURAL GAS	---	---	---	---	275	---	---
-HEAT CREDIT	---	---	---	(93)	(13)	218)	---
TOTAL VARIABLE O&M COST	4926	4598	4107	6067	8756	4599	3605
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	7
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	316	316	422	607	599	650	316
MAINTENANCE							
-LABOR & MATERIAL	2635	2784	1451	2971	3254	2747	1650
TOTAL FIXED O&M COST	2952	3100	1873	3578	3853	3398	1973
OVERHEAD							
-PLANT	1476	1550	937	1789	1926	1699	987
-ADMINISTRATIVE	32	32	42	61	60	65	32
-MARKETING	---	---	---	130	76	95	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	1305)	---	---	---
-SULFUR	---	---	---	---	765)	954)	---
NET OPERATING COST	9385	9280	6959	10320	13907	8902	6597
LEVELIZED - 30 YEARS							

-LEVELIZED CAPITAL COST (MILL/KWH)	3.48	3.68	3.74	4.34	4.79	4.17	2.94
-LEVELIZED OPERATING COST (MILL/KWH)	5.05	4.99	3.75	5.55	7.49	4.79	3.55
TOTAL LEVELIZED COST (MILL/KWH)	8.53	8.68	7.49	9.90	12.27	8.96	6.49

TABLE G-1. 13 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: ERCOT		PLANT SIZE: 100 MW		COAL: 1.00 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	270	600	241	128	99	114	303
GAS HANDLING	2564	2551	2565	2794	2838	3033	2974
CHLORIDE PURGE	---	---	---	2006	1046	---	---
SO2 ABSORPTION	5338	5629	5411	3206	4920	5623	8714
STACK GAS REHEAT	762	791	791	718	703	---	---
REGENERATION	---	---	49	1349	1518	1470	---
SLUDGE DISPOSAL	569	595	542	---	---	---	118
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	710	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	870	350	---
ESP CREDIT	---	---	---	---	---	---	(4067)
SERVICES, UTILITIES, MISC	570	610	576	655	720	635	483
SLUDGE POND	300	329	296	---	103	---	86
TOTAL DIRECT INVESTMENT	10372	11105	10471	11566	12817	11225	8612
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	933	999	942	1041	1154	1010	775
CONSTRUCTION EXPENSE	1660	1777	1675	1850	2051	1796	1378
CONTRACTOR FEES	519	555	524	578	641	561	431
CONTINGENCY	2697	2887	2723	3007	3332	3648	2879
ALLOWANCE FOR SHAKEDOWN	1588	1699	1604	1804	1989	1751	1335
INTEREST DURING CONSTRUCTION	2692	2883	2718	3002	3327	2914	2235
LAND	18	21	18	14	14	14	55
WORKING CAPITAL	79	75	59	89	212	66	49
TOTAL CAPITAL INVESTMENT	20558	22001	20735	22951	25537	22985	17748

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 14 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: ERCOT

PLANT SIZE: 100 MW

COAL: 1.00 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	137	---	130	---	---	---	151
-LIMESTONE	---	83	---	89	---	---	---
-SODA ASH	---	---	10	---	1039	40	---
-MAGNESIUM OXIDE	---	---	---	10	---	---	---
-COAL	---	---	---	---	---	28	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	476	510	237	466	468	670	442
-WATER	7	7	9	25	144	86	3
-STEAM	332	304	332	341	1070	---	---
-FUEL OIL	---	---	---	172	---	69	---
-NATURAL GAS	---	---	---	---	-31	---	---
-HEAT CREDIT	---	---	---	(8)	(-1)	(20)	---
TOTAL VARIABLE O&M COST	952	905	718	1095	2691	874	596
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	121	121	173	229	227	247	121
MAINTENANCE							
-LABOR & MATERIAL	999	1069	611	1021	1126	986	671
TOTAL FIXED O&M COST	1120	1190	784	1251	1353	1232	794
OVERHEAD							
-PLANT	560	595	392	625	676	616	397
-ADMINISTRATIVE	12	12	17	23	23	25	12
-MARKETING	---	---	---	12	-9	9	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(119)	---	---	---
-SULFUR	---	---	---	---	(-87)	(87)	---
NET OPERATING COST	2644	2702	1911	2887	4822	2668	1798
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.28	5.65	5.33	5.90	6.56	5.90	4.56
-LEVELIZED OPERATING COST (MILL/KWH)	7.11	7.27	5.14	7.77	12.98	7.18	4.84
TOTAL LEVELIZED COST (MILL/KWH)	12.39	12.92	10.47	13.67	19.53	13.08	9.40

TABLE G-1. 15 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: ERCOT

PLANT SIZE: 100 MW

COAL: 0.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER

DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	476	928	433	216	180	207	531
GAS HANDLING	2398	2385	2401	2615	2657	2840	2781
CHLORIDE PURGE	---	---	---	1876	978	---	---
SO2 ABSORPTION	5010	5283	5057	2996	4599	5256	8180
STACK GAS REHEAT	712	741	741	671	657	---	---
REGENERATION	---	---	82	2184	2455	2377	---
SLUDGE DISPOSAL	752	786	879	---	---	---	195
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1268	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1571	632	---
ESP CREDIT	---	---	---	---	---	---	(3842)
SERVICES, UTILITIES, MISC	561	607	576	710	786	679	471
SLUDGE POND	565	626	550	---	96	---	80
TOTAL DIRECT INVESTMENT	10473	11357	10719	12536	13979	11990	8397

INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	943	1022	965	1128	1258	1079	756
CONSTRUCTION EXPENSE	1676	1817	1715	2006	2237	1918	1343
CONTRACTOR FEES	524	568	536	627	699	600	420
CONTINGENCY	2723	2953	2787	3259	3435	3897	2768
ALLOWANCE FOR SHAKEDOWN	1577	1709	1617	1956	2171	1870	1302
INTEREST DURING CONSTRUCTION	2719	2948	2782	3254	3629	3112	2180
LAND	31	36	31	14	14	14	58
WORKING CAPITAL	89	80	72	106	209	75	63
TOTAL CAPITAL INVESTMENT	20755	22490	21224	24885	27831	24555	17286

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 16 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW REGION: ERCOT PLANT SIZE: 100 MW COAL: 0.75 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	318	---	303	---	---	---	350
-LIMESTONE	---	194	---	89	---	---	---
-SODA ASH	---	---	23	---	1069	94	---
-MAGNESIUM OXIDE	---	---	---	23	---	---	---
-COAL	---	---	---	---	---	66	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	447	481	228	456	439	624	412
-WATER	7	7	8	34	144	77	2
-STEAM	309	285	309	318	996	---	---
-FUEL OIL	---	---	---	401	---	160	---
-NATURAL GAS	---	---	---	---	8	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(46)	---
TOTAL VARIABLE O&M COST	1081	967	871	1300	2657	975	765
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	115	115	165	218	216	235	115
MAINTENANCE							
-LABOR & MATERIAL	991	1073	618	1107	1229	1053	655
TOTAL FIXED O&M COST	1106	1189	784	1326	1445	1287	771
OVERHEAD							
-PLANT	553	594	392	663	722	644	386
-ADMINISTRATIVE	12	12	17	22	22	23	12
-MARKETING	---	---	---	28	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(277)	---	---	---
-SULFUR	---	---	---	---	(23)	(202)	---
NET OPERATING COST	2751	2762	2063	3062	4825	2748	1933
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.33	5.78	5.45	6.39	7.15	6.31	4.44
-LEVELIZED OPERATING COST (MILL/KWH)	7.40	7.43	5.55	8.24	12.99	7.40	5.20
TOTAL LEVELIZED COST (MILL/KWH)	12.74	13.21	11.00	14.63	20.13	13.70	9.64

TABLE G-1. 17 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: MAAC PLANT SIZE: 500 MW COAL: 1.90 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	770	1345	712	334	297	342	852
GAS HANDLING	6249	6248	6140	6689	6794	7263	7252
CHLORIDE PURGE	---	---	---	5870	3061	---	---
SO2 ABSORPTION	12282	12952	13330	7884	12079	13803	19981
STACK GAS REHEAT	1857	1851	1851	1733	1706	---	---
REGENERATION	---	---	125	3269	3673	3557	---
SLUDGE DISPOSAL	950	993	1318	---	---	---	298
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2061	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2577	1036	---
ESP CREDIT	---	---	---	---	---	---	(10100)
SERVICES, UTILITIES, MISC	1326	1403	1409	1670	1811	1560	1097
SLUDGE POND	956	1069	918	---	323	---	269
TOTAL DIRECT INVESTMENT	24391	25861	25802	29510	32320	27560	19649
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2195	2328	2322	2656	2909	2480	1768
CONSTRUCTION EXPENSE	3902	4138	4128	4722	5171	4410	3144
CONTRACTOR FEES	1220	1293	1290	1476	1616	1378	982
CONTINGENCY	6342	6724	6708	7673	8403	8957	6897
ALLOWANCE FOR SHAKEDOWN	3709	3928	3933	4604	5010	4299	3038
INTEREST DURING CONSTRUCTION	6331	6713	6698	7660	8390	7154	5101
LAND	342	405	340	86	86	86	1072
WORKING CAPITAL	249	235	197	304	507	229	166
TOTAL CAPITAL INVESTMENT	48680	51625	51419	58690	64411	56554	41817

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 18 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: MAAC PLANT SIZE: 500 MW COAL: 1.90 % SULFUR							
OPERATING COST	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
(VARIABLE)							
RAW MATERIAL							
-LIME	556	---	529	---	---	---	612
-LIMESTONE	---	255	---	360	---	---	---
-SODA ASH	---	---	51	---	1210	210	---
-MAGNESIUM OXIDE	---	---	---	51	---	---	---
-COAL	---	---	---	---	---	232	---
-CATALYST	---	---	---	1	---	2	---
UTILITIES							
-ELECTRICITY	1396	1560	748	1447	1430	2090	1379
-WATER	23	23	27	89	450	295	9
-STEAM	1034	1006	1035	1063	3336	---	---
-FUEL OIL	---	---	---	766	---	305	---
-NATURAL GAS	---	---	---	---	108	---	---
-HEAT CREDIT	---	---	---	(40)	(4)	(94)	---
TOTAL VARIABLE O&M COST	3009	2844	2390	3737	6531	3040	2000
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	5
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	343	343	457	657	649	705	343
MAINTENANCE							
-LABOR & MATERIAL	1900	2012	1022	2060	2244	1913	1168
TOTAL FIXED O&M COST	2243	2355	1478	2717	2893	2618	1515
OVERHEAD							
-PLANT	1121	1177	739	1359	1446	1309	758
-ADMINISTRATIVE	34	34	46	66	65	71	34
-MARKETING	---	---	---	56	23	41	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(561)	---	---	---
-SULFUR	---	---	---	---	(227)	(410)	---
NET OPERATING COST	6408	5410	4654	7374	10731	6669	4308
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	2.50	2.65	2.64	3.01	3.31	2.91	2.15
-LEVELIZED OPERATING COST (MILL/KWH)	3.45	3.45	2.50	3.97	5.78	3.59	2.32
TOTAL LEVELIZED COST (MILL/KWH)	5.95	6.10	5.15	6.98	9.08	6.49	4.47

TABLE G-1. 19 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: MAAC		PLANT SIZE: 500 MW		COAL: 1.25 % SULFUR	
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1365	2096	1284	560	536	617	1496
GAS HANDLING	6302	6301	6191	6743	6850	7323	7313
CHLORIDE PURGE	---	---	---	5919	3087	---	---
SO2 ABSORPTION	12379	13056	13444	7951	12181	13920	20140
STACK GAS REHEAT	1873	1866	1866	1747	1720	---	---
REGENERATION	---	---	205	5257	5904	5718	---
SLUDGE DISPOSAL	1251	1308	2124	---	---	---	491
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3653	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4616	1856	---
ESP CREDIT	---	---	---	---	---	---	(10173)
SERVICES, UTILITIES, MISC	1390	1478	1507	1910	2094	1766	1156
SLUDGE POND	1765	1993	1667	---	325	---	271
TOTAL DIRECT INVESTMENT	26325	28098	28287	33742	37314	31199	20695
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2369	2529	2546	3037	3358	2808	1863
CONSTRUCTION EXPENSE	4212	4496	4526	5399	5970	4992	3311
CONTRACTOR FEES	1316	1405	1414	1687	1866	1560	1035
CONTINGENCY	6845	7305	7355	8773	9702	10140	7014
ALLOWANCE FOR SHAKEDOWN	3930	4184	4246	5264	5788	4867	3201
INTEREST DURING CONSTRUCTION	6834	7294	7343	8759	9686	8099	5372
LAND	716	862	713	86	86	86	1274
WORKING CAPITAL	311	268	263	398	534	301	233
TOTAL CAPITAL INVESTMENT	52859	56440	56693	67144	74303	64052	43998

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 20 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: MAAC		PLANT SIZE: 500 MW		COAL: 1.25 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST								
(VARIABLE)								
RAW MATERIAL								
-LIME		1278	---	1217	---	---	---	1407
-LIMESTONE		---	586	---	360	---	---	---
-SODA ASH		---	---	118	---	1245	483	---
-MAGNESIUM OXIDE		---	---	---	117	---	---	---
-COAL		---	---	---	---	---	533	---
-CATALYST		---	---	---	2	---	5	---
UTILITIES								
-ELECTRICITY		1417	1595	784	1553	1453	2108	1392
-WATER		25	25	28	134	498	277	9
-STEAM		1043	1031	1044	1073	3366	---	---
-FUEL OIL		---	---	---	1762	---	702	---
-NATURAL GAS		---	---	---	---	360	---	---
-HEAT CREDIT		---	---	---	(92)	(12)	(216)	---
TOTAL VARIABLE O&M COST		3762	3236	3191	4908	6909	3893	2807
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	6
LABOR								
-OPERATING, ANALYSIS, SUPERVISION		328	328	437	628	621	674	328
MAINTENANCE								
-LABOR & MATERIAL		2014	2144	1113	2356	2592	2166	1230
TOTAL FIXED O&M COST		2342	2472	1551	2984	3213	2840	1564
OVERHEAD								
-PLANT		1171	1236	775	1492	1607	1420	782
-ADMINISTRATIVE		33	33	44	63	62	67	33
-MARKETING		---	---	---	129	75	94	---
BYPRODUCT SALES								
-SULFURIC ACID		---	---	---	(1290)	---	---	---
-SULFUR		---	---	---	---	(755)	(944)	---
NET OPERATING COST		7308	6977	5561	8286	11112	7371	5186
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)		2.72	2.90	2.91	3.45	3.82	3.29	2.26
-LEVELIZED OPERATING COST (MILL/KWH)		3.93	3.76	2.99	4.46	5.98	3.97	2.79
TOTAL LEVELIZED COST (MILL/KWH)		6.65	6.65	5.91	7.91	9.80	7.26	5.05

TABLE G-1. 21 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: MAAC		PLANT SIZE: 100 MW		COAL: 1.90 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	270	600	241	128	99	114	303
GAS HANDLING	1736	1724	1748	1903	1933	2067	2013
CHLORIDE PURGE	---	---	---	1358	708	---	---
SO2 ABSORPTION	3690	3891	3649	2163	3322	3796	6031
STACK GAS REHEAT	515	543	543	487	476	---	---
REGENERATION	---	---	49	1349	1518	1470	---
SLUDGE DISPOSAL	569	595	542	---	---	---	118
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	710	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	870	350	---
ESP CREDIT	---	---	---	---	---	---	(2921)
SERVICES, UTILITIES, MISC	407	441	406	486	536	468	333
SLUDGE POND	300	329	296	---	68	---	57
TOTAL DIRECT INVESTMENT	7486	8123	7474	8585	9531	8264	5933
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	674	731	673	773	858	744	534
CONSTRUCTION EXPENSE	1198	1300	1196	1374	1525	1322	949
CONTRACTOR FEES	374	406	374	429	477	413	297
CONTINGENCY	1946	2112	1943	2232	2478	2686	2083
ALLOWANCE FOR SHAKEDOWN	1138	1234	1136	1339	1480	1289	920
INTEREST DURING CONSTRUCTION	1943	2109	1940	2229	2474	2145	1540
LAND	115	128	114	86	86	86	270
WORKING CAPITAL	55	49	42	65	177	48	35
TOTAL CAPITAL INVESTMENT	14929	16192	14893	17111	19085	16997	12561

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 22 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: MAAC		PLANT SIZE: 100 MW		COAL: 1.90 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	118	---	112	---	---	---	---	130
-LIMESTONE	---	54	---	77	---	---	---	---
-SODA ASH	---	---	11	---	1148	45	---	---
-MAGNESIUM OXIDE	---	---	---	11	---	---	---	---
-COAL	---	---	---	---	---	49	---	---
-CATALYST	---	---	---	0	---	0	---	---
UTILITIES								
-ELECTRICITY	322	341	159	316	313	443	293	
-WATER	5	5	6	19	99	63	2	
-STEAM	219	198	219	226	708	---	---	
-FUEL OIL	---	---	---	163	---	65	---	
-NATURAL GAS	---	---	---	---	-42	---	---	
-HEAT CREDIT	---	---	---	(8)	(-1)	(20)	---	
TOTAL VARIABLE O&M COST		664	598	507	802	2227	645	424
(FIXED)								
WASTE DISPOSAL (TRUCKING)								
LABOR	---	---	---	---	---	---	1	
-OPERATING, ANALYSIS, SUPERVISION	142	142	200	269	266	289	142	
MAINTENANCE								
-LABOR & MATERIAL	715	776	434	758	838	726	463	
TOTAL FIXED O&M COST		857	918	633	1027	1103	1015	605
OVERHEAD								
-PLANT	429	459	317	513	552	507	303	
-ADMINISTRATIVE	14	14	20	27	27	29	14	
-MARKETING	---	---	---	12	-9	9	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(119)	---	---	---	
-SULFUR	---	---	---	---	(-87)	(87)	---	
NET OPERATING COST		1964	1989	1477	2262	3987	2118	1347
LEVELIZED - 30 YEARS								

-LEVELIZED CAPITAL COST (MILL/KWH)	3.83	4.16	3.83	4.40	4.90	4.37	3.23	
-LEVELIZED OPERATING COST (MILL/KWH)	5.29	5.35	3.98	6.09	10.73	5.70	3.62	
TOTAL LEVELIZED COST (MILL/KWH)		9.12	9.51	7.80	10.48	15.63	10.07	6.85

TABLE G-1. 23 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: MAAC PLANT SIZE: 100 MW COAL: 1.25 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	473	922	430	214	178	205	527
GAS HANDLING	1750	1739	1762	1919	1949	2084	2030
CHLORIDE PURGE	---	---	---	1369	714	---	---
SO2 ABSORPTION	3719	3922	3680	2181	3350	3828	6079
STACK GAS REHEAT	520	547	547	491	480	---	---
REGENERATION	---	---	81	2170	2439	2362	---
SLUDGE DISPOSAL	749	783	873	---	---	---	194
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1259	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1559	627	---
ESP CREDIT	---	---	---	---	---	---	(2942)
SERVICES, UTILITIES, MISC	433	475	442	576	640	546	353
SLUDGE POND	360	621	545	---	69	---	58
TOTAL DIRECT INVESTMENT	8204	9009	8362	10180	11380	9653	6299
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	738	811	753	916	1024	869	567
CONSTRUCTION EXPENSE	1313	1442	1338	1629	1821	1544	1008
CONTRACTOR FEES	410	450	418	509	569	483	315
CONTINGENCY	2133	2342	2174	2647	2959	3137	2135
ALLOWANCE FOR SHAKEDOWN	1224	1343	1250	1588	1768	1506	977
INTEREST DURING CONSTRUCTION	2130	2339	2171	2643	2954	2506	1635
LAND	194	225	193	86	86	86	313
WORKING CAPITAL	68	56	56	85	185	64	49
TOTAL CAPITAL INVESTMENT	16414	18018	16714	20282	22746	19847	13297

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 24 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: MAAC PLANT SIZE: 100 MW COAL: 1.25 % SULFUR							
OPERATING COST	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN-LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
(VARIABLE)							
RAW MATERIAL							
-LIME	271	---	258	---	---	---	298
-LIMESTONE	---	124	---	77	---	---	---
-SODA ASH	---	---	25	---	1181	102	---
-MAGNESIUM OXIDE	---	---	---	25	---	---	---
-COAL	---	---	---	---	---	113	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	327	349	166	339	318	447	295
-WATER	5	5	6	29	109	59	2
-STEAM	221	203	221	228	714	---	---
-FUEL OIL	---	---	---	374	---	149	---
-NATURAL GAS	---	---	---	---	10	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(46)	---
TOTAL VARIABLE O&M COST	824	681	677	1051	2331	826	595
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	127	127	180	240	237	258	127
MAINTENANCE							
-LABOR & MATERIAL	768	843	479	899	1001	848	491
TOTAL FIXED O&M COST	895	970	659	1139	1238	1106	619
OVERHEAD							
-PLANT	447	485	330	570	619	553	310
-ADMINISTRATIVE	13	13	18	24	24	26	13
-MARKETING	---	---	---	27	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(274)	---	---	---
-SULFUR	---	---	---	---	(21)	(200)	---
NET OPERATING COST	2179	2148	1684	2538	4194	2330	1537
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.22	4.63	4.29	5.21	5.84	5.10	3.42
-LEVELIZED OPERATING COST (MILL/KWH)	5.87	5.78	4.53	6.83	11.29	6.27	4.14
TOTAL LEVELIZED COST (MILL/KWH)	10.08	10.41	8.82	12.04	17.13	11.37	7.55

TABLE D-1. 25 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: MAIN	PLANT SIZE: 500 MW	COAL: 3.40 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3519	4407	3411	1309	1410	1623	3790
GAS HANDLING	6457	6457	6340	6908	7016	7500	7493
CHLORIDE PURGE	---	---	---	6065	3163	---	---
SO2 ABSORPTION	12667	13359	13778	8148	12483	14265	20606
STACK GAS REHEAT	1919	1910	1910	1790	1762	---	---
REGENERATION	---	---	463	11431	12828	12424	---
SLUDGE DISPOSAL	1964	2051	4634	---	---	---	1111
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9309	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	11971	4812	---
ESP CREDIT	---	---	---	---	---	---	(10384)
SERVICES, UTILITIES, MISC	1592	1691	1832	2698	3038	2437	1357
SLUDGE POND	4715	5421	4314	---	334	---	278
TOTAL DIRECT INVESTMENT	32832	35296	36682	47657	54005	43061	24252
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2955	3177	3301	4289	4860	3875	2183
CONSTRUCTION EXPENSE	5253	5647	5869	7625	8641	6890	3880
CONTRACTOR FEES	1642	1765	1834	2383	2700	2153	1213
CONTINGENCY	8536	9177	9537	12391	14041	13995	9188
ALLOWANCE FOR SHUTDOWN	4650	4964	5291	7435	8391	6717	3756
INTEREST DURING CONSTRUCTION	8523	9162	9522	12371	14019	11178	6296
LAND	2603	3164	2591	85	85	85	2151
WORKING CAPITAL	599	430	568	1065	628	707	544
TOTAL CAPITAL INVESTMENT	67593	72782	75196	95301	107370	88661	53462

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1. 26 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: MAIN		PLANT SIZE: 500 MW		COAL: 3.40 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	4629	---	4409	---	---	---	---	5098
-LIMESTONE	---	2285	---	334	---	---	---	---
-SODA ASH	---	---	383	---	1085	1568	---	---
-MAGNESIUM OXIDE	---	---	---	437	---	---	---	---
-COAL	---	---	---	---	---	1916	---	---
-CATALYST	---	---	---	6	---	19	---	---
UTILITIES								
-ELECTRICITY	1496	1742	955	2072	1541	2163	1428	
-WATER	32	34	32	361	737	354	11	
-STEAM	1070	1137	1071	1101	3453	---	---	
-FUEL OIL	---	---	---	9194	---	3663	---	
-NATURAL GAS	---	---	---	---	1518	---	---	
-HEAT CREDIT	---	---	---	(359)	(58)	(843)	---	
TOTAL VARIABLE O&M COST		7228	5199	6851	13147	8276	8840	6536
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	10
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	378	378	502	722	714	777	378	
MAINTENANCE								
-LABOR & MATERIAL	2387	2548	1423	3328	3757	2989	1443	
TOTAL FIXED O&M COST		2764	2926	1924	4050	4471	3766	1830
OVERHEAD								
-PLANT	1382	1463	962	2025	2236	1883	915	
-ADMINISTRATIVE	38	38	50	72	71	78	38	
-MARKETING	---	---	---	503	348	368	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(5034)	---	---	---	
-SULFUR	---	---	---	---	(3484)	(3482)	---	
NET OPERATING COST		11412	9625	9787	14763	11918	11253	9320
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	3.47	3.74	3.86	4.90	5.52	4.55	2.75	
-LEVELIZED OPERATING COST (MILL/KWH)	6.14	5.18	5.27	7.95	6.41	6.06	5.02	
TOTAL LEVELIZED COST (MILL/KWH)		9.61	8.92	9.13	12.84	11.93	10.61	7.76

TABLE G-1. 27 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: MAIN		PLANT SIZE: 500 MW		COAL: 1.10 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER

DIRECT INVESTMENT							

MATERIALS HANDLING/PREPARATION	1379	2113	1297	566	542	624	1511
GAS HANDLING	6904	6906	6771	7378	7493	8010	8012
CHLORIDE PURGE	---	---	---	6485	3382	---	---
SO2 ABSORPTION	13496	14233	14741	8717	13353	15259	21949
STACK GAS REHEAT	2052	2037	2037	1913	1884	---	---
REGENERATION	---	---	207	5301	5953	5766	---
SLUDGE DISPOSAL	1258	1314	2142	---	---	---	495
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3690	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4663	1875	---
ESP CREDIT	---	---	---	---	---	---	(10990)
SERVICES, UTILITIES, MISC.	1505	1596	1632	2043	2236	1892	1259
SLUDGE POND	1784	2015	1685	---	358	---	299
TOTAL DIRECT INVESTMENT	28376	30214	30512	36091	39865	33425	22535
INDIRECT INVESTMENT							

ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2554	2719	2746	3248	3588	3008	2028
CONSTRUCTION EXPENSE	4540	4834	4882	5775	6378	5348	3606
CONTRACTOR FEES	1419	1511	1526	1805	1993	1671	1127
CONTINGENCY	7378	7856	7933	9384	10365	10863	7575
ALLOWANCE FOR SHAKEDOWN	4248	4512	4591	5630	6183	5214	3486
INTEREST DURING CONSTRUCTION	7366	7843	7920	9369	10348	8677	5850
LAND	716	862	713	85	85	85	1003
WORKING CAPITAL	325	290	271	468	555	330	238
TOTAL CAPITAL INVESTMENT	56923	60642	61095	71854	79360	68621	47446

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1. 28 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: MAIN	PLANT SIZE: 500 MW	COAL: 1.10 % SULFUR				
OPERATING COST	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
(VARIABLE)							
RAW MATERIAL							
-LINE	1204	---	1147	---	---	---	1326
-LIMESTONE	---	594	---	334	---	---	---
-SODA ASH	---	---	100	---	1036	408	---
-MAGNESIUM OXIDE	---	---	---	114	---	---	---
-COAL	---	---	---	---	---	498	---
-CATALYST	---	---	---	2	---	5	---
UTILITIES							
-ELECTRICITY	1551	1750	859	1693	1595	2322	1533
-WATER	27	27	31	141	541	300	9
-STEAM	1149	1138	1150	1182	3707	---	---
-FUEL OIL	---	---	---	2391	---	952	---
-NATURAL GAS	---	---	---	---	335	---	---
-HEAT CREDIT	---	---	---	(93)	(13)	(219)	---
TOTAL VARIABLE O&M COST	3931	3510	3286	5763	7202	4267	2868
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	4
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	324	324	433	622	614	667	324
MAINTENANCE							
-LABOR & MATERIAL	2177	2312	1202	2520	2769	2320	1340
TOTAL FIXED O&M COST	2501	2636	1635	3142	3384	2987	1668
OVERHEAD							
-PLANT	1251	1318	817	1571	1692	1494	834
-ADMINISTRATIVE	32	32	43	62	61	67	32
-MARKETING	---	---	---	131	77	96	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1309)	---	---	---
-SULFUR	---	---	---	---	(768)	(958)	---
NET OPERATING COST	7715	7497	5782	9359	11648	7953	5403
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	2.92	3.12	3.14	3.69	4.08	3.53	2.44
-LEVELIZED OPERATING COST (MILL/KWH)	4.15	4.04	3.11	5.04	6.27	4.28	2.91
TOTAL LEVELIZED COST (MILL/KWH)	7.08	7.15	6.25	8.73	10.35	7.81	5.35

TABLE G-1. 29 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: MAIN	PLANT SIZE: 100 MW	COAL: 3.40 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	1198	1894	1122	498	469	540	1316
GAS HANDLING	1793	1782	1805	1966	1997	2134	2080
CHLORIDE PURGE	---	---	---	1403	732	---	---
SO2 ABSORPTION	3806	4013	3771	2235	3433	3923	6220
STACK GAS REHEAT	532	560	560	503	492	---	---
REGENERATION	---	---	183	4719	5300	5133	---
SLUDGE DISPOSAL	1175	1228	1905	---	---	---	438
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3207	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4043	1625	---
ESP CREDIT	---	---	---	---	---	---	(3003)
SERVICES, UTILITIES, MISC	510	569	561	872	988	801	423
SLUDGE POND	1536	1731	1457	---	71	---	59
TOTAL DIRECT INVESTMENT	10551	11777	11365	15403	17524	14157	7533
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	950	1060	1023	1386	1577	1274	678
CONSTRUCTION EXPENSE	1688	1884	1818	2464	2804	2265	1205
CONTRACTOR FEES	528	589	568	770	876	708	377
CONTINGENCY	2743	3062	2955	4005	4556	4601	2854
ALLOWANCE FOR SHAKEDOWN	1492	1664	1627	2403	2727	2208	1169
INTEREST DURING CONSTRUCTION	2739	3057	2950	3998	4549	3675	1956
LAND	594	713	591	85	85	85	498
WORKING CAPITAL	129	91	120	227	195	150	115
TOTAL CAPITAL INVESTMENT	21414	23897	23018	30741	34893	29122	16385

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 30 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: MAIN PLANT SIZE: 100 MW COAL: 3.40 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	982	---	935	---	---	---	1081
-LIMESTONE	---	485	---	71	---	---	---
-SODA ASH	---	---	81	---	1029	333	---
-MAGNESIUM OXIDE	---	---	---	93	---	---	---
-COAL	---	---	---	---	---	406	---
-CATALYST	---	---	---	1	---	4	---
UTILITIES							
-ELECTRICITY	344	380	203	449	337	459	303
-WATER	7	7	7	77	159	75	2
-STEAM	227	225	227	233	732	---	---
-FUEL OIL	---	---	---	1950	---	777	---
-NATURAL GAS	---	---	---	---	258	---	---
-HEAT CREDIT	---	---	---	(76)	(10)	(179)	---
TOTAL VARIABLE O&M COST	1560	1097	1453	2798	2506	1875	1386
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	2
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	177	177	245	334	330	361	177
MAINTENANCE							
-LABOR & MATERIAL	932	1039	630	1360	1544	1243	588
TOTAL FIXED O&M COST	1109	1216	875	1694	1874	1604	767
OVERHEAD							
-PLANT	554	608	437	847	937	802	383
-ADMINISTRATIVE	18	18	24	33	33	36	18
-MARKETING	---	---	---	107	59	78	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1068)	---	---	---
-SULFUR	---	---	---	---	(593)	(781)	---
NET OPERATING COST	3241	2938	2790	4412	4816	3614	2554
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.50	6.14	5.91	7.90	8.96	7.48	4.21
-LEVELIZED OPERATING COST (MILL/KWH)	8.72	7.91	7.51	11.87	12.96	9.73	6.87
TOTAL LEVELIZED COST (MILL/KWH)	14.22	14.05	13.42	19.77	21.92	17.21	11.08

TABLE G-1. 31 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: MAIN		PLANT SIZE: 100 MW		COAL: 1.10 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	477	929	434	216	180	207	532
GAS HANDLING	1917	1906	1928	2099	2132	2279	2224
CHLORIDE PURGE	---	---	---	1500	782	---	---
SO ₂ ABSORPTION	4055	4276	4035	2391	3672	4197	6625
STACK GAS REHEAT	569	598	598	538	526	---	---
REGENERATION	---	---	82	2188	2460	2382	---
SLUDGE DISPOSAL	753	787	881	---	---	---	195
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1271	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1575	633	---
ESP CREDIT	---	---	---	---	---	---	(3179)
SERVICES, UTILITIES, MISC	466	510	477	612	680	582	384
SLUDGE POND	566	628	551	---	76	---	63
TOTAL DIRECT INVESTMENT	8804	9633	8986	10816	12084	10281	6845
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	792	867	809	973	1088	925	616
CONSTRUCTION EXPENSE	1409	1541	1438	1731	1933	1645	1095
CONTRACTOR FEES	440	482	449	541	604	514	342
CONTINGENCY	2289	2505	2336	2812	3142	3341	2301
ALLOWANCE FOR SHAKEDOWN	1317	1440	1347	1687	1877	1604	1062
INTEREST DURING CONSTRUCTION	2285	2501	2333	2808	3137	2669	1777
LAND	194	225	193	85	85	85	254
WORKING CAPITAL	71	61	58	100	177	70	51
TOTAL CAPITAL INVESTMENT	17601	19253	17947	21554	24127	21133	14344

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 32 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: MAIN

PLANT SIZE: 100 MW

COAL: 1.10 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	255	---	243	---	---	---	281
-LIMESTONE	---	126	---	71	---	---	---
-SODA ASH	---	---	21	---	983	86	---
-MAGNESIUM OXIDE	---	---	---	24	---	---	---
-COAL	---	---	---	---	---	106	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	358	383	182	369	349	493	325
-WATER	6	6	7	30	118	64	2
-STEAM	244	224	244	251	786	---	---
-FUEL OIL	---	---	---	507	---	202	---
-NATURAL GAS	---	---	---	---	10	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(46)	---
34 TOTAL VARIABLE O&M COST	863	738	697	1233	2246	905	608
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	123	123	176	234	231	251	123
MAINTENANCE							
-LABOR & MATERIAL	827	904	516	955	1063	903	534
TOTAL FIXED O&M COST	950	1027	691	1189	1294	1154	658
OVERHEAD							
-PLANT	475	514	346	594	647	577	329
-ADMINISTRATIVE	12	12	18	23	23	25	12
-MARKETING	---	---	---	28	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(278)	---	---	---
-SULFUR	---	---	---	---	(24)	(203)	---
NET OPERATING COST	2300	2291	1752	2790	4189	2478	1608
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.52	4.95	4.61	5.54	6.20	5.43	3.68
-LEVELIZED OPERATING COST (MILL/KWH)	6.19	6.17	4.71	7.51	11.27	6.67	4.33
TOTAL LEVELIZED COST (MILL/KWH)	10.71	11.11	9.32	13.04	17.47	12.10	8.01

TABLE G-1. 33 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: MARCA-1

PLANT SIZE: 500 MW

COAL: 0.95 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	770	1345	712	334	297	342	852
GAS HANDLING	10236	10257	9973	10868	11037	11798	11880
CHLORIDE PURGE	---	---	---	9616	5015	---	---
SO2 ABSORPTION	19590	20661	21942	12967	19849	22683	31821
STACK GAS REHEAT	3043	2976	2976	2826	2789	---	---
REGENERATION	---	---	125	3269	3673	3557	---
SLUDGE DISPOSAL	950	993	1318	---	---	---	298
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2061	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2577	1036	---
ESP CREDIT	---	---	---	---	---	---	(15346)
SERVICES, UTILITIES, MISC	2075	2174	2223	2516	2714	2365	1770
SLUDGE POND	956	1069	918	---	544	---	453
TOTAL DIRECT INVESTMENT	37620	39475	40186	44457	48495	41781	31729
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3386	3553	3617	4001	4365	3760	2856
CONSTRUCTION EXPENSE	6019	6316	6430	7113	7759	6685	5077
CONTRACTOR FEES	1881	1974	2009	2223	2425	2089	1586
CONTINGENCY	9781	10263	10448	11559	12609	13579	10577
ALLOWANCE FOR SHAKEDOWN	5773	6051	6177	6935	7511	6518	4904
INTEREST DURING CONSTRUCTION	9766	10247	10432	11540	12588	10846	8236
LAND	68	81	68	17	17	17	269
WORKING CAPITAL	385	403	300	456	758	338	248
TOTAL CAPITAL INVESTMENT	74679	78362	79667	88302	96526	85612	65483

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 34 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: MARCA-1

PLANT SIZE: 500 MW

COAL: 0.95 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	595	---	567	---	---	---	656
-LIMESTONE	---	509	---	386	---	---	---
-SODA ASH	---	---	44	---	1034	179	---
-MAGNESIUM OXIDE	---	---	---	47	---	---	---
-COAL	---	---	---	---	---	80	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	2285	2594	1246	2366	2382	3525	2327
-WATER	38	38	46	127	728	448	14
-STEAM	1744	1733	1745	1794	5627	---	---
-FUEL OIL	---	---	---	923	---	368	---
-NATURAL GAS	---	---	---	---	60	---	---
-HEAT CREDIT	---	---	---	(40)	(4)	(94)	---
TOTAL VARIABLE O&M COST	4662	4875	3648	5603	9827	4507	2996
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	6
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	321	321	428	615	608	660	321
MAINTENANCE							
-LABOR & MATERIAL	2956	3099	1596	3104	3364	2900	1885
TOTAL FIXED O&M COST	3277	3420	2024	3719	3972	3560	2212
OVERHEAD							
-PLANT	1639	1710	1012	1860	1986	1780	1106
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	56	23	41	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(561)	---	---	---
-SULFUR	---	---	---	---	(227)	(410)	---
NET OPERATING COST	9610	10036	6727	10739	15642	9544	6346
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.84	4.03	4.09	4.54	4.96	4.40	3.36
-LEVELIZED OPERATING COST (MILL/KWH)	5.17	5.40	3.62	3.78	8.42	5.14	3.42
TOTAL LEVELIZED COST (MILL/KWH)	9.01	9.43	7.71	10.32	13.38	9.53	6.78

TABLE G-1: 35 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: MARCA-1

PLANT SIZE: 500 MW

COAL: 0.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLHAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1331	2055	1251	548	522	601	1459
GAS HANDLING	8366	8376	8179	8913	9052	9676	9710
CHLORIDE PURGE	---	---	---	7859	4099	---	---
SO2 ABSORPTION	16186	17071	17898	10580	16202	18515	26309
STACK GAS REHEAT	2487	2451	2451	2314	2281	---	---
REGENERATION	---	---	201	5148	5782	5600	---
SLUDGE DISPOSAL	1234	1292	2080	---	---	---	480
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3562	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4499	1808	---
ESP CREDIT	---	---	---	---	---	---	(12934)
SERVICES, UTILITIES, MISC	1776	1875	1924	2335	2546	2172	1501
SLUDGE POND	1718	1940	1624	---	439	---	366
TOTAL DIRECT INVESTMENT	33101	35060	35607	41259	45422	38372	26892
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2979	3155	3205	3713	4088	3453	2420
CONSTRUCTION EXPENSE	5296	5610	5697	6601	7267	6140	4303
CONTRACTOR FEES	1655	1753	1780	2063	2271	1919	1345
CONTINGENCY	8606	9116	9258	10727	11810	12471	8865
ALLOWANCE FOR SHAKEDOWN	4992	5275	5392	6436	7042	5986	4159
INTEREST DURING CONSTRUCTION	8592	9101	9243	10710	11791	9961	6981
LAND	138	166	137	17	17	17	247
WORKING CAPITAL	384	388	317	493	644	336	278
TOTAL CAPITAL INVESTMENT	65743	69624	70636	82020	90351	78654	55488

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 36 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: MARCA-1		PLANT SIZE: 500 MW		COAL: 0.75 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	1320	---	1257	---	---	---	---	1453
-LIMESTONE	---	1129	---	386	---	---	---	---
-SODA ASH	---	---	97	---	1062	398	---	---
-MAGNESIUM OXIDE	---	---	---	104	---	---	---	---
-COAL	---	---	---	---	---	177	---	---
-CATALYST	---	---	---	1	---	2	---	---
UTILITIES								
-ELECTRICITY	1876	2127	1038	2021	1943	2847	1879	
-WATER	32	32	38	150	639	353	11	
-STEAM	1408	1402	1409	1449	4544	---	---	
-FUEL OIL	---	---	---	2046	---	815	---	
-NATURAL GAS	---	---	---	---	190	---	---	
-HEAT CREDIT	---	---	---	(89)	(12)	(208)	---	
TOTAL VARIABLE O&M COST		4637	4690	3840	6069	8365	4383	3343
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	5
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	316	316	422	607	599	650	316	
MAINTENANCE								
-LABOR & MATERIAL	2557	2703	1406	2881	3154	2664	1598	
TOTAL FIXED O&M COST		2874	3019	1828	3487	3753	3314	1920
OVERHEAD								
-PLANT	1437	1510	914	1744	1877	1657	960	
-ADMINISTRATIVE	32	32	42	61	60	65	32	
-MARKETING	---	---	---	124	72	91	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1244)	---	---	---	
-SULFUR	---	---	---	---	(721)	(910)	---	
NET OPERATING COST		8979	9250	6624	10241	13407	8601	6255
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	3.38	3.58	3.63	4.21	4.64	4.04	2.85	
-LEVELIZED OPERATING COST (MILL/KWH)	4.83	4.98	3.57	5.51	7.22	4.63	3.37	
TOTAL LEVELIZED COST (MILL/KWH)		8.21	8.56	7.19	9.73	11.86	8.67	6.22

TABLE G-1. 37 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: MARCA-1 PLANT SIZE: 100 MW COAL: 0.95 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	270	600	241	128	99	114	303
GAS HANDLING	2843	2830	2839	3092	3141	3357	3298
CHLORIDE PURGE	---	---	---	2224	1160	---	---
SO2 ABSORPTION	5886	6207	6006	3557	5459	6238	9605
STACK GAS REHEAT	844	873	873	795	779	---	---
REGENERATION	---	---	49	1349	1518	1470	---
SLUDGE DISPOSAL	569	595	542	---	---	---	118
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	710	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	870	350	---
ESP CREDIT	---	---	---	---	---	---	(4438)
SERVICES, UTILITIES, MISC	625	666	633	711	782	692	533
SLUDGE POND	300	329	296	---	115	---	96
TOTAL DIRECT INVESTMENT	11336	12100	11479	12568	13922	12221	9514
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1020	1089	1033	1131	1253	1100	856
CONSTRUCTION EXPENSE	1814	1936	1837	2011	2228	1955	1522
CONTRACTOR FEES	567	605	574	628	696	611	476
CONTINGENCY	2947	3146	2985	3268	3620	3972	3172
ALLOWANCE FOR SHAKEDOWN	1738	1855	1761	1961	2160	1906	1475
INTEREST DURING CONSTRUCTION	2943	3141	2980	3262	3614	3172	2470
LAND	23	26	23	17	17	17	65
WORKING CAPITAL	85	85	64	98	223	72	53
TOTAL CAPITAL INVESTMENT	22473	23982	22735	24944	27733	25026	19603

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1. 38 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: MARCA-1 PLANT SIZE: 100 MW COAL: 0.95 % SULFUR							
OPERATING COST	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER

(VARIABLE)							
RAW MATERIAL							
-LIME	126	---	120	---	---	---	139
-LIMESTONE	---	108	---	82	---	---	---
-SODA ASH	---	---	9	---	980	38	---
-MAGNESIUM OXIDE	---	---	---	10	---	---	---
-COAL	---	---	---	---	---	17	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	528	567	264	517	521	748	493
-WATER	8	8	10	28	159	95	3
-STEAM	370	340	370	380	1193	---	---
-FUEL OIL	---	---	---	196	---	78	---
-NATURAL GAS	---	---	---	---	-23	---	---
-HEAT CREDIT	---	---	---	(8)	(-1)	(20)	---
TOTAL VARIABLE O&M COST	1032	1024	774	1205	2833	956	635
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	120	120	171	227	225	244	120
MAINTENANCE							
-LABOR & MATERIAL	1093	1167	671	1110	1223	1073	742
TOTAL FIXED O&M COST	1213	1287	842	1337	1447	1317	863
OVERHEAD							
-PLANT	607	643	421	669	724	659	431
-ADMINISTRATIVE	12	12	17	23	22	24	12
-MARKETING	---	---	---	12	-9	9	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(119)	---	---	---
-SULFUR	---	---	---	---	(-87)	(87)	---
NET OPERATING COST	2864	2966	2054	3126	5105	2878	1942
LEVELIZED - 30 YEARS							

-LEVELIZED CAPITAL COST (MILL/KWH)	5.77	6.16	5.84	6.41	7.12	6.43	5.04
-LEVELIZED OPERATING COST (MILL/KWH)	7.71	7.98	5.53	8.41	13.74	7.74	5.23
TOTAL LEVELIZED COST (MILL/KWH)	13.48	14.14	11.37	14.82	20.86	14.17	10.26

TABLE B-1. 39 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: MARCA-1

PLANT SIZE: 100 MW

COAL: 0.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	461	905	419	210	174	200	514
GAS HANDLING	2323	2311	2328	2536	2576	2753	2695
CHLORIDE PURGE	---	---	---	1818	948	---	---
SO2 ABSORPTION	4863	5128	4899	2903	4456	5092	7941
STACK GAS REHEAT	690	719	719	651	637	---	---
REGENERATION	---	---	80	2125	2389	2314	---
SLUDGE DISPOSAL	740	774	855	---	---	---	189
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1227	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1519	611	---
ESP CREDIT	---	---	---	---	---	---	(3741)
SERVICES, UTILITIES, MISC	545	590	558	688	762	658	456
SLUDGE POND	545	604	531	---	93	---	78
TOTAL DIRECT INVESTMENT	10167	11031	10389	12157	13554	11628	8133
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	915	993	935	1094	1220	1047	732
CONSTRUCTION EXPENSE	1627	1765	1662	1945	2169	1860	1301
CONTRACTOR FEES	508	552	519	608	678	581	407
CONTINGENCY	2644	2868	2701	3161	3524	3779	2681
ALLOWANCE FOR SHAKEDOWN	1532	1660	1568	1896	2105	1814	1261
INTEREST DURING CONSTRUCTION	2639	2864	2697	3156	3518	3018	2111
LAND	38	44	38	17	17	17	61
WORKING CAPITAL	84	82	67	106	200	71	59
TOTAL CAPITAL INVESTMENT	20154	21858	20576	24140	26985	23816	16746

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 40 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: MARCA-1

PLANT SIZE: 100 MW

COAL: 0.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LINE	280	---	267	---	---	---	308
-LIMESTONE	---	239	---	82	---	---	---
-SODA ASH	---	---	21	---	1007	84	---
-MAGNESIUM OXIDE	---	---	---	22	---	---	---
-COAL	---	---	---	---	---	37	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	433	465	220	441	425	604	399
-WATER	7	7	8	32	140	75	2
-STEAM	299	276	299	307	964	---	---
-FUEL OIL	---	---	---	434	---	173	---
-NATURAL GAS	---	---	---	---	4	---	---
-HEAT CREDIT	---	---	---	(19)	(0)	(44)	---
TOTAL VARIABLE O&M COST	1019	987	814	1300	2539	930	709
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	115	115	165	218	216	235	115
MAINTENANCE							
-LABOR & MATERIAL	962	1043	599	1074	1192	1021	634
TOTAL FIXED O&M COST	1077	1158	765	1292	1407	1256	751
OVERHEAD							
-PLANT	539	579	382	646	704	628	375
-ADMINISTRATIVE	12	12	17	22	22	23	12
-MARKETING	---	---	---	26	1	19	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(264)	---	---	---
-SULFUR	---	---	---	---	(14)	(193)	---
NET OPERATING COST	2646	2736	1978	3023	4660	2663	1846
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.18	5.61	5.28	6.20	6.93	6.12	4.30
-LEVELIZED OPERATING COST (MILL/KWH)	7.12	7.36	5.32	8.14	12.54	7.17	4.97
TOTAL LEVELIZED COST (MILL/KWH)	12.30	12.98	10.61	14.34	19.47	13.28	9.27

TABLE G-1. 41 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: MARCA-2		PLANT SIZE: 500 MW		COAL: 3.50 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3523	4410	3415	1311	1411	1625	3795
GAS HANDLING	7017	7020	6881	7497	7614	8139	8143
CHLORIDE PURGE	---	---	---	6591	3437	---	---
SO2 ABSORPTION	13705	14454	14985	8861	13573	15511	22288
STACK GAS REHEAT	2086	2069	2069	1944	1915	---	---
REGENERATION	---	---	463	11442	12840	12435	---
SLUDGE DISPOSAL	1965	2052	4638	---	---	---	1113
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9319	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	11984	4818	---
ESP CREDIT	---	---	---	---	---	---	(11143)
SERVICES, UTILITIES, MISC	1698	1800	1947	2818	3166	2552	1452
SLUDGE POND	4720	5427	4319	---	365	---	304
TOTAL DIRECT INVESTMENT	34713	37233	38718	49782	56306	45079	25952
INDIRECT INVESTMENT							
43 ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3124	3351	3485	4480	5068	4057	2336
CONSTRUCTION EXPENSE	5554	5957	6195	7965	9009	7213	4152
CONTRACTOR FEES	1736	1862	1936	2489	2815	2254	1298
CONTINGENCY	9025	9681	10067	12943	14640	14651	9880
ALLOWANCE FOR SHAKEDOWN	4943	5266	5608	7766	8747	7032	4018
INTEREST DURING CONSTRUCTION	9011	9665	10050	12923	14616	11702	6737
LAND	3271	3976	3256	106	106	106	2505
WORKING CAPITAL	723	642	682	981	662	665	670
TOTAL CAPITAL INVESTMENT	72100	77632	79996	99436	111969	92759	57546

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 42 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: MARCA-2

PLANT SIZE: 500 MW

COAL: 3.50 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	5885	---	5604	---	---	---	6480
-LIMESTONE	---	4578	---	424	---	---	---
-SODA ASH	---	---	387	---	1095	1584	---
-MAGNESIUM OXIDE	---	---	---	425	---	---	---
-COAL	---	---	---	---	---	1724	---
-CATALYST	---	---	---	6	---	17	---
UTILITIES							
-ELECTRICITY	1621	1887	1025	2202	1673	2363	1560
-WATER	34	36	35	367	776	390	12
-STEAM	1169	1237	1170	1202	3772	---	---
-FUEL OIL	---	---	---	7881	---	3140	---
-NATURAL GAS	---	---	---	---	1471	---	---
-HEAT CREDIT	---	---	---	(359)	(58)	(844)	---
44 TOTAL VARIABLE O&M COST	8709	7738	8222	12148	8728	8374	8052
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	9
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	380	380	505	726	718	781	380
MAINTENANCE							
-LABOR & MATERIAL	2536	2702	1504	3476	3917	3129	1544
TOTAL FIXED O&M COST	2916	3082	2008	4202	4635	3911	1933
OVERHEAD							
-PLANT	1458	1541	1004	2101	2318	1955	966
-ADMINISTRATIVE	38	38	50	73	72	78	38
-MARKETING	---	---	---	504	349	369	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5042)	---	---	---
-SULFUR	---	---	---	---	(3490)	(3688)	---
NET OPERATING COST	13122	12399	11285	13986	12612	10999	10989
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.70	3.99	4.11	5.11	5.75	4.77	2.96
-LEVELIZED OPERATING COST (MILL/KWH)	7.06	6.57	6.07	7.53	6.79	5.92	5.91
TOTAL LEVELIZED COST (MILL/KWH)	10.77	10.56	10.18	12.64	12.54	10.68	8.87

TABLE G-1. 43 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: MARCA-2

PLANT SIZE: 500 MW

COAL: 1.00 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1369	2101	1288	562	538	619	1500
GAS HANDLING	7555	7561	7399	8062	8188	8753	8768
CHLORIDE PURGE	---	---	---	7097	3701	---	---
SO2 ABSORPTION	14697	15501	16147	9547	14621	16709	23897
STACK GAS REHEAT	2246	2222	2222	2092	2061	---	---
REGENERATION	---	---	206	5269	5918	5731	---
SLUDGE DISPOSAL	1253	1310	2129	---	---	---	492
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3663	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4629	1861	---
ESP CREDIT	---	---	---	---	---	---	(11863)
SERVICES, UTILITIES, MISC	1627	1722	1763	2177	2379	2020	1368
SLUDGE POND	1770	2000	1672	---	394	---	329
TOTAL DIRECT INVESTMENT	30518	32415	32825	38469	42430	35693	24491
INDIRECT INVESTMENT							
45 ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2747	2917	2954	3462	3819	3212	2204
CONSTRUCTION EXPENSE	4883	5186	5252	6155	6789	5711	3919
CONTRACTOR FEES	1526	1621	1641	1923	2121	1785	1225
CONTINGENCY	7935	8428	8535	10002	11032	11600	8187
ALLOWANCE FOR SHAKEDOWN	4584	4857	4953	6001	6580	5568	3788
INTEREST DURING CONSTRUCTION	7922	8414	8521	9986	11014	9265	6357
LAND	890	1071	886	106	106	106	1244
WORKING CAPITAL	373	362	312	467	598	333	279
TOTAL CAPITAL INVESTMENT	61375	65272	65879	76572	84489	73274	51694

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 44 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: MARCA-2

PLANT SIZE: 500 MW

COAL: 1.00 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1512	---	1440	---	---	---	1665
-LIMESTONE	---	1176	---	424	---	---	---
-SODA ASH	---	---	100	---	1045	407	---
-MAGNESIUM OXIDE	---	---	---	109	---	---	---
-COAL	---	---	---	---	---	443	---
-CATALYST	---	---	---	2	---	4	---
UTILITIES							
-ELECTRICITY	1696	1918	939	1841	1750	2555	1687
-WATER	29	30	34	146	585	327	10
-STEAM	1264	1255	1265	1300	4079	---	---
-FUEL OIL	---	---	---	2025	---	807	---
-NATURAL GAS	---	---	---	---	320	---	---
-HEAT CREDIT	---	---	---	(92)	(13)	(217)	---
TOTAL VARIABLE O&M COST	4502	4379	3778	5755	7767	4326	3362
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	4
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	322	322	430	617	610	662	322
MAINTENANCE							
-LABOR & MATERIAL	2348	2489	1295	2686	2947	2478	1456
TOTAL FIXED O&M COST	2671	2811	1724	3303	3557	3140	1782
OVERHEAD							
-PLANT	1335	1405	862	1652	1779	1570	891
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	130	76	95	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1296)	---	---	---
-SULFUR	---	---	---	---	(758)	(948)	---
NET OPERATING COST	8540	8627	6408	9606	12480	8250	6067
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.15	3.35	3.38	3.93	4.34	3.76	2.66
-LEVELIZED OPERATING COST (MILL/KWH)	4.60	4.64	3.45	5.17	6.72	4.44	3.27
TOTAL LEVELIZED COST (MILL/KWH)	7.75	8.00	6.83	9.10	11.06	8.20	5.92

TABLE 0-1. 45 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: MARCA-2

PLANT SIZE: 100 MW

COAL: 3.50 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1199	1895	1123	499	469	540	1317
GAS HANDLING	1949	1937	1959	2133	2167	2316	2261
CHLORIDE PURGE	---	---	---	1524	795	---	---
SO2 ABSORPTION	4118	4342	4102	2431	3733	4266	4728
STACK GAS REHEAT	579	607	607	547	535	---	---
REGENERATION	---	---	184	4723	5305	5138	---
SLUDGE DISPOSAL	1176	1229	1907	---	---	---	439
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3211	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4047	1627	---
ESP CREDIT	---	---	---	---	---	---	(3223)
SERVICES, UTILITIES, MISC	541	601	593	904	1023	833	451
SLUDGE POND	1538	1733	1459	---	77	---	64
TOTAL DIRECT INVESTMENT	11099	12344	11933	15972	18152	14720	8038
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	999	1111	1074	1437	1634	1325	723
CONSTRUCTION EXPENSE	1776	1975	1909	2555	2904	2355	1286
CONTRACTOR FEES	555	617	597	799	908	736	402
CONTINGENCY	2886	3209	3103	4153	4719	4784	3060
ALLOWANCE FOR SHUTDOWN	1578	1752	1716	2492	2824	2296	1247
INTEREST DURING CONSTRUCTION	2881	3204	3098	4146	4712	3821	2086
LAND	746	896	743	106	106	106	584
WORKING CAPITAL	156	136	145	209	204	141	142
TOTAL CAPITAL INVESTMENT	22676	25245	24316	31869	36163	30285	17568

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 46 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: MARCA-2

PLANT SIZE: 100 MW

COAL: 3.50 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1248	---	1189	---	---	---	1374
-LIMESTONE	---	971	---	90	---	---	---
-SODA ASH	---	---	82	---	1038	336	---
-MAGNESIUM OXIDE	---	---	---	90	---	---	---
-COAL	---	---	---	---	---	366	---
-CATALYST	---	---	---	1	---	4	---
UTILITIES							
-ELECTRICITY	373	412	217	477	366	501	331
-WATER	7	8	7	78	168	83	3
-STEAM	248	245	248	255	800	---	---
-FUEL OIL	---	---	---	1671	---	666	---
-NATURAL GAS	---	---	---	---	250	---	---
-HEAT CREDIT	---	---	---	(76)	(10)	(179)	---
TOTAL VARIABLE O&M COST	1877	1635	1744	2587	2613	1776	1708
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	2
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	179	179	248	338	335	365	179
MAINTENANCE							
-LABOR & MATERIAL	986	1095	663	1411	1599	1293	627
TOTAL FIXED O&M COST	1165	1274	911	1749	1933	1658	808
OVERHEAD							
-PLANT	582	637	456	874	967	829	404
-ADMINISTRATIVE	18	18	25	34	33	37	18
-MARKETING	---	---	---	107	59	78	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1069)	---	---	---
-SULFUR	---	---	---	---	(594)	(782)	---
NET OPERATING COST	3642	3563	3136	4282	5011	3596	2938
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.82	6.48	6.25	8.19	9.29	7.78	4.51
-LEVELIZED OPERATING COST (MILL/KWH)	9.80	9.59	8.44	11.52	13.49	9.68	7.91
TOTAL LEVELIZED COST (MILL/KWH)	15.62	16.07	14.68	19.71	22.77	17.46	12.42

TABLE G-1. 47 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: MARCA-2

PLANT SIZE: 100 MW

COAL: 1.00 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELL-HAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	474	924	431	215	179	206	528
GAS HANDLING	2098	2086	2106	2294	2330	2491	2434
CHLORIDE PURGE	---	---	---	1641	856	---	---
SO2 ABSORPTION	4416	4656	4419	2619	4021	4595	7213
STACK GAS REHEAT	623	652	652	588	576	---	---
REGENERATION	---	---	82	2175	2445	2368	---
SLUDGE DISPOSAL	750	784	875	---	---	---	194
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1262	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1563	628	---
ESP CREDIT	---	---	---	---	---	---	(3431)
SERVICES, UTILITIES, MISC.	502	546	514	648	718	617	416
SLUDGE POND	562	623	547	---	84	---	70
TOTAL DIRECT INVESTMENT	9425	10272	9626	11442	12772	10906	7425
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	848	924	866	1030	1150	982	668
CONSTRUCTION EXPENSE	1508	1644	1540	1831	2044	1745	1188
CONTRACTOR FEES	471	514	481	572	639	545	371
CONTINGENCY	2450	2671	2503	2975	3321	3544	2482
ALLOWANCE FOR SHAKEDOWN	1414	1540	1447	1785	1984	1701	1151
INTEREST DURING CONSTRUCTION	2447	2666	2499	2970	3315	2831	1927
LAND	241	280	240	106	106	106	316
WORKING CAPITAL	82	76	66	100	187	71	59
TOTAL CAPITAL INVESTMENT	18886	20587	19270	22812	25518	22431	15588

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 48 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: MARCA-2		PLANT SIZE: 100 MW		COAL: 1.00 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	321	---	---	305	---	---	---	353
-LIMESTONE	---	249	---	---	90	---	---	---
-SODA ASH	---	---	---	21	---	992	86	---
-MAGNESIUM OXIDE	---	---	---	---	23	---	---	---
-COAL	---	---	---	---	---	---	94	---
-CATALYST	---	---	---	---	0	---	1	---
UTILITIES								
-ELECTRICITY	391	419	---	199	402	383	542	358
-WATER	6	6	---	7	31	128	69	2
-STEAM	268	247	---	268	276	865	---	---
-FUEL OIL	---	---	---	---	429	---	171	---
-NATURAL GAS	---	---	---	---	---	9	---	---
-HEAT CREDIT	---	---	---	---	(20)	(0)	(46)	---
TOTAL VARIABLE O&M COST		987	922	801	1232	2376	918	713
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	1
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	121	121	---	173	229	227	247	121
MAINTENANCE								
-LABOR & MATERIAL	888	967	---	554	1011	1123	958	579
TOTAL FIXED O&M COST		1009	1088	726	1240	1350	1204	701
OVERHEAD								
-PLANT	504	544	---	363	620	675	602	350
-ADMINISTRATIVE	12	12	---	17	23	23	25	12
-MARKETING	---	---	---	---	27	2	20	---
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	---	(275)	---	---	---
-SULFUR	---	---	---	---	---	(22)	(201)	---
NET OPERATING COST		2512	2566	1908	2868	4404	2567	1777
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL./KWH)	4.85	5.29	---	4.95	5.86	6.55	5.76	4.00
-LEVELIZED OPERATING COST (MILL./KWH)	6.76	6.91	---	5.14	7.72	11.85	6.91	4.78
TOTAL LEVELIZED COST (MILL./KWH)		11.61	12.19	10.09	13.58	18.41	12.67	8.78

TABLE G-1. 49 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: NPCC

PLANT SIZE: 500 MW

COAL: 1.90 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	770	1345	712	334	297	342	852
GAS HANDLING	6387	6387	6272	6834	6941	7420	7412
CHLORIDE PURGE	---	---	---	5999	3129	---	---
SO2 ABSORPTION	12537	13222	13626	8059	12346	14109	20395
STACK GAS REHEAT	1898	1890	1890	1771	1743	---	---
REGENERATION	---	---	125	3269	3673	3557	---
SLUDGE DISPOSAL	950	993	1318	---	---	---	298
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2061	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2577	1036	---
ESP CREDIT	---	---	---	---	---	---	(10288)
SERVICES, UTILITIES, MISC.	1353	1430	1437	1700	1842	1588	1120
SLUDGE POND	956	1069	918	---	330	---	275
TOTAL DIRECT INVESTMENT	24850	26335	26298	30026	32878	28051	20064
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2237	2370	2367	2702	2959	2525	1806
CONSTRUCTION EXPENSE	3976	4214	4208	4804	5260	4488	3210
CONTRACTOR FEES	1243	1317	1315	1501	1644	1403	1003
CONTINGENCY	6461	6847	6837	7807	8548	9117	7042
ALLOWANCE FOR SHAKEDOWN	3781	4001	4011	4684	5096	4376	3102
INTEREST DURING CONSTRUCTION	6451	6836	6827	7794	8535	7282	5208
LAND	342	405	340	86	86	86	943
WORKING CAPITAL	274	253	220	320	518	237	191
TOTAL CAPITAL INVESTMENT	49614	52579	52423	59725	65524	57563	42571

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 50 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: NPCC		PLANT SIZE: 500 MW		COAL: 1.90 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME		804	---	765	---	---	---	885
-LIMESTONE		---	417	---	521	---	---	---
-SODA ASH		---	---	53	---	1246	216	---
-MAGNESIUM OXIDE		---	---	---	51	---	---	---
-COAL		---	---	---	---	---	286	---
-CATALYST		---	---	---	1	---	3	---
UTILITIES								
-ELECTRICITY		1427	1596	765	1478	1463	2139	1412
-WATER		24	24	28	91	460	302	9
-STEAM		1058	1030	1059	1088	3414	---	---
-FUEL OIL		---	---	---	739	---	294	---
-NATURAL GAS		---	---	---	---	97	---	---
-HEAT CREDIT		---	---	---	(40)	(4)	(94)	---
TOTAL VARIABLE O&M COST		3312	3066	2670	3928	6675	3146	2306
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	4
LABOR								
-OPERATING, ANALYSIS, SUPERVISION		343	343	457	657	649	705	343
MAINTENANCE								
-LABOR & MATERIAL		1937	2049	1041	2097	2282	1947	1193
TOTAL FIXED O&M COST		2279	2392	1498	2753	2932	2652	1539
OVERHEAD								
-PLANT		1140	1196	749	1377	1466	1326	770
-ADMINISTRATIVE		34	34	46	66	65	71	34
-MARKETING		---	---	---	56	23	41	---
BYPRODUCT SALES								
-SULFURIC ACID		---	---	---	(561)	---	---	---
-SULFUR		---	---	---	---	(227)	(410)	---
NET OPERATING COST		6766	6589	4963	7618	10933	6826	4649
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL./KWH)		2.55	2.70	2.69	3.07	3.37	2.96	2.19
-LEVELIZED OPERATING COST (MILL./KWH)		3.64	3.60	2.67	4.10	5.88	3.67	2.50
TOTAL LEVELIZED COST (MILL./KWH)		6.19	6.30	5.36	7.17	9.25	6.63	4.69

TABLE G-1. 51 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: NPCC	PLANT SIZE: 500 MW	COAL: 1.25 % SULFUR				
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1357	2087	1276	558	533	614	1488
GAS HANDLING	6365	6365	6252	6811	6918	7395	7387
CHLORIDE PURGE	---	---	---	5978	3118	---	---
SO2 ABSORPTION	12497	13180	13580	8031	12304	14060	20330
STACK GAS REHEAT	1892	1884	1884	1765	1737	---	---
REGENERATION	---	---	204	5232	5876	5691	---
SLUDGE DISPOSAL	1248	1304	2114	---	---	---	489
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3632	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4589	1845	---
ESP CREDIT	---	---	---	---	---	---	(10259)
SERVICES, UTILITIES, MISC	1402	1489	1519	1920	2105	1776	1166
SLUDGE POND	1754	1981	1657	---	329	---	274
TOTAL DIRECT INVESTMENT	26514	28290	28485	33928	37509	31381	20874
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2386	2546	2564	3053	3376	2824	1879
CONSTRUCTION EXPENSE	4242	4526	4558	5428	6001	5021	3340
CONTRACTOR FEES	1326	1414	1424	1696	1875	1569	1044
CONTINGENCY	6894	7355	7406	8821	9752	10199	7075
ALLOWANCE FOR SHAKEDOWN	3961	4215	4278	5293	5818	4895	3229
INTEREST DURING CONSTRUCTION	6883	7344	7394	8807	9737	8146	5419
LAND	710	855	707	86	86	86	1128
WORKING CAPITAL	360	300	309	407	538	311	285
TOTAL CAPITAL INVESTMENT	53276	56846	57126	67520	74693	64433	44272

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 52 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: NPCC		PLANT SIZE: 500 MW		COAL: 1.25 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	1833	---	1745	---	---	---	---	2018
-LIMESTONE	---	950	---	521	---	---	---	---
-SODA ASH	---	---	121	---	1281	---	493	---
-MAGNESIUM OXIDE	---	---	---	116	---	---	---	---
-COAL	---	---	---	---	---	---	652	---
-CATALYST	---	---	---	---	2	---	7	---
UTILITIES								
-ELECTRICITY	1431	1611	791	1566	1467	2131	1406	
-WATER	25	25	29	134	502	280	9	
-STEAM	1054	1042	1055	1084	3401	---	---	
-FUEL OIL	---	---	---	1684	---	671	---	
-NATURAL GAS	---	---	---	---	321	---	---	
-HEAT CREDIT	---	---	---	(91)	(12)	(214)	---	
TOTAL VARIABLE O&M COST		4343	3628	3741	5016	6960	4020	3433
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	5
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	328	328	437	628	621	674	328	
MAINTENANCE								
-LABOR & MATERIAL	2030	2160	1122	2369	2606	2178	1241	
TOTAL FIXED O&M COST		2358	2488	1559	2997	3227	2853	1574
OVERHEAD								
-PLANT	1179	1244	779	1499	1613	1426	787	
-ADMINISTRATIVE	33	33	44	63	62	67	33	
-MARKETING	---	---	---	128	75	94	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1280)	---	---	---	
-SULFUR	---	---	---	---	(747)	(936)	---	
NET OPERATING COST		7912	7393	6123	8423	11190	7524	5827
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	2.74	2.92	2.93	3.47	3.84	3.31	2.27	
-LEVELIZED OPERATING COST (MILL/KWH)	4.26	3.98	3.30	4.53	6.02	4.05	3.14	
TOTAL LEVELIZED COST (MILL/KWH)		7.00	6.90	6.23	8.00	9.86	7.36	5.41

TABLE G-1. 53 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: NPCC PLANT SIZE: 100 MW COAL: 1.90 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	270	600	241	128	99	114	303
GAS HANDLING	1774	1762	1786	1945	1975	2111	2057
CHLORIDE PURGE	---	---	---	1387	724	---	---
SO2 ABSORPTION	3767	3972	3730	2211	3396	3880	6156
STACK GAS REHEAT	527	554	554	498	487	---	---
REGENERATION	---	---	49	1349	1518	1470	---
SLUDGE DISPOSAL	569	595	542	---	---	---	118
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	710	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	870	350	---
ESP CREDIT	---	---	---	---	---	---	(2976)
SERVICES, UTILITIES, MISC.	414	449	414	494	544	475	340
SLUDGE POND	300	329	296	---	70	---	58
TOTAL DIRECT INVESTMENT	7620	8261	7613	8722	9682	8400	6056
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	686	744	685	785	871	756	545
CONSTRUCTION EXPENSE	1219	1322	1218	1396	1549	1344	969
CONTRACTOR FEES	381	413	381	436	484	420	303
CONTINGENCY	1981	2148	1979	2268	2517	2730	2126
ALLOWANCE FOR SHAKEDOWN	1159	1256	1158	1361	1503	1310	939
INTEREST DURING CONSTRUCTION	1978	2145	1976	2264	2513	2181	1572
LAND	115	128	114	86	86	86	242
WORKING CAPITAL	60	53	47	69	182	50	41
TOTAL CAPITAL INVESTMENT	15199	16470	15171	17386	19389	17278	12793

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 54 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: NPCC		PLANT SIZE: 100 MW		COAL: 1.90 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	170	---	162	---	---	---	---	188
-LIMESTONE	---	88	---	111	---	---	---	---
-SODA ASH	---	---	11	---	1182	46	---	---
-MAGNESIUM OXIDE	---	---	---	11	---	---	---	---
-COAL	---	---	---	---	---	61	---	---
-CATALYST	---	---	---	0	---	1	---	---
UTILITIES								
-ELECTRICITY	329	349	162	323	320	454	299	
-WATER	5	5	6	20	101	64	2	
-STEAM	224	202	225	231	724	---	---	
-FUEL OIL	---	---	---	157	---	62	---	
-NATURAL GAS	---	---	---	---	-38	---	---	
-HEAT CREDIT	---	---	---	(8)	(-1)	(20)	---	
TOTAL VARIABLE O&M COST	729	645	566	843	2290	667	489	
(FIXED)								
WASTE DISPOSAL (TRUCKING)								
LABOR	---	---	---	---	---	---	1	
-OPERATING, ANALYSIS, SUPERVISION	142	142	200	269	266	289	142	
MAINTENANCE								
-LABOR & MATERIAL	728	789	442	770	851	738	472	
TOTAL FIXED O&M COST	870	931	642	1039	1117	1027	615	
OVERHEAD								
-PLANT	435	466	321	519	558	513	307	
-ADMINISTRATIVE	14	14	20	27	27	29	14	
-MARKETING	---	---	---	12	-9	9	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(119)	---	---	---	
-SULFUR	---	---	---	---	(-87)	(87)	---	
NET OPERATING COST	2049	2056	1549	2321	4070	2158	1426	
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	3.90	4.23	3.90	4.47	4.98	4.44	3.29	
-LEVELIZED OPERATING COST (MILL/KWH)	5.51	5.53	4.17	6.25	10.95	5.81	3.84	
TOTAL LEVELIZED COST (MILL/KWH)	9.42	9.76	8.06	10.71	15.93	10.25	7.12	

TABLE G-1. 55 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: NPCC	PLANT SIZE: 100 MW	COAL: 1.25 % SULFUR				
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	470	918	427	213	177	204	524
GAS HANDLING	1768	1756	1780	1938	1969	2104	2051
CHLORIDE PURGE	---	---	---	1383	721	---	---
SO2 ABSORPTION	3755	3959	3717	2203	3384	3867	6137
STACK GAS REHEAT	525	553	553	496	485	---	---
REGENERATION	---	---	81	2160	2428	2351	---
SLUDGE DISPOSAL	747	781	869	---	---	---	193
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1251	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1550	623	---
ESP CREDIT	---	---	---	---	---	---	(2967)
SERVICES, UTILITIES, MISC.	436	478	446	579	643	549	356
SLUDGE POND	557	617	542	---	70	---	58
TOTAL DIRECT INVESTMENT	8257	9063	8414	10224	11427	9699	6351
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	743	816	757	920	1028	873	572
CONSTRUCTION EXPENSE	1321	1450	1346	1636	1828	1552	1016
CONTRACTOR FEES	413	453	421	511	571	485	318
CONTINGENCY	2147	2356	2188	2658	2971	3152	2153
ALLOWANCE FOR SHAKEDOWN	1232	1352	1258	1595	1776	1513	985
INTEREST DURING CONSTRUCTION	2143	2353	2184	2654	2966	2518	1649
LAND	193	224	192	86	86	86	282
WORKING CAPITAL	79	63	66	87	189	66	61
TOTAL CAPITAL INVESTMENT	16528	18129	16827	20370	22842	19943	13385

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 56 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: NPCC		PLANT SIZE: 100 MW		COAL: 1.25 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	389	---	370	---	---	---	428
-LIMESTONE	---	202	---	111	---	---	---
-SODA ASH	---	---	26	---	1215	105	---
-MAGNESIUM OXIDE	---	---	---	25	---	---	---
-COAL	---	---	---	---	---	138	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	330	352	168	341	321	452	298
-WATER	5	5	6	29	110	59	2
-STEAM	224	205	224	230	721	---	---
-FUEL OIL	---	---	---	357	---	142	---
-NATURAL GAS	---	---	---	---	8	---	---
-HEAT CREDIT	---	---	---	(19)	(0)	(45)	---
TOTAL VARIABLE O&M COST	948	764	793	1074	2375	852	728
(FIXED)							
WASTE DISPOSAL (TRUCKING)							
LABOR	---	---	---	---	---	---	1
-OPERATING, ANALYSIS, SUPERVISION	127	127	180	240	237	258	127
MAINTENANCE							
-LABOR & MATERIAL	773	848	482	903	1005	852	495
TOTAL FIXED O&M COST	900	975	662	1143	1243	1110	623
OVERHEAD							
-PLANT	450	488	331	572	621	555	312
-ADMINISTRATIVE	13	13	18	24	24	26	13
-MARKETING	---	---	---	27	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(271)	---	---	---
-SULFUR	---	---	---	---	(19)	(198)	---
NET OPERATING COST	2311	2240	1805	2568	4245	2365	1676
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.25	4.66	4.32	5.23	5.87	5.12	3.44
-LEVELIZED OPERATING COST (MILL/KWH)	6.22	6.03	4.86	6.91	11.43	6.36	4.51
TOTAL LEVELIZED COST (MILL/KWH)	10.46	10.69	9.18	12.14	17.29	11.49	7.95

TABLE G-1. 57 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: SERC

PLANT SIZE: 500 MW

COAL: 3.50 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3512	4399	3404	1307	1407	1619	3783
GAS HANDLING	6805	6807	6676	7274	7388	7897	7897
CHLORIDE PURGE	---	---	---	6392	3333	---	---
SO2 ABSORPTION	13313	14040	14528	8591	13161	15039	21653
STACK GAS REHEAT	2023	2009	2009	1886	1857	---	---
REGENERATION	---	---	462	11413	12807	12403	---
SLUDGE DISPOSAL	1962	2049	4626	---	---	---	1110
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9290	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	11946	4803	---
ESP CREDIT	---	---	---	---	---	---	(10857)
SERVICES, UTILITIES, MISC	1657	1758	1902	2769	3114	2506	1415
SLUDGE POND	4705	5409	4306	---	353	---	294
TOTAL DIRECT INVESTMENT	33976	36472	37914	48921	55366	44267	25295
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3058	3283	3412	4403	4983	3984	2277
CONSTRUCTION EXPENSE	5436	5836	6066	7827	8859	7083	4047
CONTRACTOR FEES	1699	1824	1896	2446	2768	2213	1265
CONTINGENCY	8834	9483	9858	12720	14395	14387	9630
ALLOWANCE FOR SHAKEDOWN	4830	5149	5484	7632	8602	6906	3917
INTEREST DURING CONSTRUCTION	8820	9468	9842	12699	14372	11491	6566
LAND	798	970	795	26	26	26	677
WORKING CAPITAL	780	390	743	778	648	659	736
TOTAL CAPITAL INVESTMENT	68230	72874	76009	97452	110019	91016	54409

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 58 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: SERC		PLANT SIZE: 500 MW		COAL: 3.50 % SULFUR	
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LINE	6658	---	6340	---	---	---	7331
-LIMESTONE	---	1657	---	482	---	---	---
-SODA ASH	---	---	449	---	1275	1838	---
-MAGNESIUM OXIDE	---	---	---	442	---	---	---
-COAL	---	---	---	---	---	2429	---
-CATALYST	---	---	---	6	---	24	---
UTILITIES							
-ELECTRICITY	1573	1832	998	2150	1623	2287	1510
-WATER	33	35	34	364	760	377	12
-STEAM	1132	1199	1132	1164	3651	---	---
-FUEL OIL	---	---	---	5451	---	2171	---
-NATURAL GAS	---	---	---	---	1282	---	---
-HEAT CREDIT	---	---	---	(358)	(57)	(840)	---
TOTAL VARIABLE O&M COST	9396	4723	8954	9701	8534	8286	8852
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	10
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	380	380	505	726	718	781	380
MAINTENANCE							
-LABOR & MATERIAL	2478	2643	1472	3416	3852	3073	1505
TOTAL FIXED O&M COST	2858	3022	1976	4142	4570	3854	1895
OVERHEAD							
-PLANT	1429	1511	988	2071	2285	1927	947
-ADMINISTRATIVE	38	38	50	73	72	78	38
-MARKETING	---	---	---	502	347	367	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5020)	---	---	---
-SULFUR	---	---	---	---	(3473)	(3671)	---
NET OPERATING COST	13721	9294	11969	11469	12334	10842	11732
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.50	3.74	3.90	5.01	5.65	4.68	2.80
-LEVELIZED OPERATING COST (MILL/KWH)	7.39	5.00	6.44	6.17	6.64	5.84	6.31
TOTAL LEVELIZED COST (MILL/KWH)	10.89	8.75	10.35	11.18	12.29	10.51	9.11

TABLE G-1. 59 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: SERC	PLANT SIZE: 500 MW	COAL: 1.20 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1379	2113	1297	566	542	624	1511
GAS HANDLING	6791	6793	6663	7260	7374	7882	7882
CHLORIDE PURGE	---	---	---	6379	3327	---	---
SO2 ABSORPTION	13288	14014	14499	8574	13134	15009	21612
STACK GAS REHEAT	2019	2005	2005	1882	1853	---	---
REGENERATION	---	---	207	5301	5953	5766	---
SLUDGE DISPOSAL	1258	1314	2142	---	---	---	495
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3690	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4663	1875	---
ESP CREDIT	---	---	---	---	---	---	(10839)
SERVICES, UTILITIES, MISC	1484	1574	1609	2019	2211	1869	1240
SLUDGE POND	1784	2015	1685	---	352	---	294
TOTAL DIRECT INVESTMENT	28002	29829	30107	35670	39409	33024	22195
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2520	2685	2710	3210	3547	2972	1998
CONSTRUCTION EXPENSE	4480	4773	4817	5707	6305	5284	3551
CONTRACTOR FEES	1400	1491	1505	1784	1970	1651	1110
CONTINGENCY	7280	7755	7828	9274	10246	10733	7502
ALLOWANCE FOR SHAKEDOWN	4190	4452	4528	5565	6113	5152	3433
INTEREST DURING CONSTRUCTION	7269	7743	7815	9259	10230	8573	5761
LAND	220	265	219	26	26	26	356
WORKING CAPITAL	366	273	312	396	558	312	285
TOTAL CAPITAL INVESTMENT	55727	59265	59841	70891	78405	67727	46191

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 60 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: SERC		PLANT SIZE: 500 MW		COAL: 1.20 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST								
(VARIABLE)								
RAW MATERIAL								
-LIME	1736	---	1654	---	---	---	---	1912
-LIMESTONE	---	432	---	482	---	---	---	---
-SODA ASH	---	---	117	---	1218	479	---	---
-MAGNESIUM OXIDE	---	---	---	115	---	---	---	---
-COAL	---	---	---	---	---	633	---	---
-CATALYST	---	---	---	2	---	6	---	---
UTILITIES								
-ELECTRICITY	1526	1721	845	1667	1569	2282	1506	
-WATER	26	27	31	140	533	299	9	
-STEAM	1129	1118	1130	1161	3643	---	---	
-FUEL OIL	---	---	---	1422	---	566	---	
-NATURAL GAS	---	---	---	---	284	---	---	
-HEAT CREDIT	---	---	---	(93)	(13)	(219)	---	
TOTAL VARIABLE O&M COST		4418	3299	3777	4896	7235	4047	3428
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	5
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	327	327	436	626	619	672	327	
MAINTENANCE								
-LABOR & MATERIAL	2147	2281	1186	2491	2738	2293	1319	
TOTAL FIXED O&M COST		2474	2508	1622	3117	3356	2964	1651
OVERHEAD								
-PLANT	1237	1304	811	1558	1678	1482	826	
-ADMINISTRATIVE	33	33	44	63	62	67	33	
-MARKETING	---	---	---	131	77	96	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1309)	---	---	---	
-SULFUR	---	---	---	---	(768)	(958)	---	
NET OPERATING COST		8161	7243	6253	8455	11640	7699	5937
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	2.86	3.04	3.07	3.64	4.03	3.48	2.37	
-LEVELIZED OPERATING COST (MILL/KWH)	4.39	3.90	3.37	4.55	6.26	4.14	3.20	
TOTAL LEVELIZED COST (MILL/KWH)		7.26	6.94	6.44	8.19	10.29	7.62	5.57

TABLE G-1. 61 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: SERC	PLANT SIZE: 100 MW	COAL: 3.50 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLNAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1195	1891	1120	497	468	538	1313
GAS HANDLING	1890	1878	1900	2070	2102	2247	2192
CHLORIDE PURGE	---	---	---	1478	771	---	---
SO2 ABSORPTION	4000	4218	3977	2357	3620	4136	6536
STACK GAS REHEAT	561	589	589	530	519	---	---
REGENERATION	---	---	183	4711	5291	5125	---
SLUDGE DISPOSAL	1174	1227	1902	---	---	---	438
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3201	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4035	1622	---
ESP CREDIT	---	---	---	---	---	---	(3140)
SERVICES, UTILITIES, MISC	529	588	580	891	1008	820	440
SLUDGE POND	1533	1727	1454	---	75	---	62
TOTAL DIRECT INVESTMENT	10883	12119	11706	15735	17889	14489	7842
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	979	1091	1054	1416	1610	1304	706
CONSTRUCTION EXPENSE	1741	1939	1873	2518	2862	2318	1255
CONTRACTOR FEES	544	606	585	787	894	724	392
CONTINGENCY	2830	3151	3043	4091	4651	4709	2986
ALLOWANCE FOR SHUTDOWN	1544	1718	1681	2455	2783	2260	1217
INTEREST DURING CONSTRUCTION	2825	3146	3039	4085	4644	3761	2036
LAND	182	219	181	26	26	26	156
WORKING CAPITAL	168	82	158	166	212	140	156
TOTAL CAPITAL INVESTMENT	21696	24070	23319	31278	35571	29731	16745

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 62 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: SERC

PLANT SIZE: 100 MW

COAL: 3.50 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1412	---	1345	---	---	---	1555
-LIMESTONE	---	351	---	103	---	---	---
-SODA ASH	---	---	95	---	1210	390	---
-MAGNESIUM OXIDE	---	---	---	94	---	---	---
-COAL	---	---	---	---	---	515	---
-CATALYST	---	---	---	1	---	5	---
UTILITIES							
-ELECTRICITY	362	400	212	466	355	485	320
-WATER	7	8	7	78	164	80	2
-STEAM	240	237	240	247	774	---	---
-FUEL OIL	---	---	---	1156	---	461	---
-NATURAL GAS	---	---	---	---	218	---	---
-HEAT CREDIT	---	---	---	(76)	(10)	(178)	---
TOTAL VARIABLE O&M COST	2021	996	1899	2068	2711	1757	1877
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	2
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	179	179	248	338	335	365	179
MAINTENANCE							
-LABOR & MATERIAL	965	1073	650	1390	1576	1272	612
TOTAL FIXED O&M COST	1144	1252	898	1728	1910	1638	793
OVERHEAD							
-PLANT	572	626	449	864	955	819	397
-ADMINISTRATIVE	18	18	25	34	33	37	18
-MARKETING	---	---	---	106	59	78	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1065)	---	---	---
-SULFUR	---	---	---	---	(591)	(779)	---
NET OPERATING COST	3755	2891	3271	3736	5078	3550	3085
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.57	6.18	5.99	8.03	9.14	7.64	4.30
-LEVELIZED OPERATING COST (MILL/KWH)	10.11	7.78	8.80	10.05	13.67	9.55	8.30
TOTAL LEVELIZED COST (MILL/KWH)	15.68	13.96	14.79	18.09	22.80	17.19	12.60

TABLE B-1. 43 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: SERC	PLANT SIZE: 100 MW	COAL: 1.20 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	477	929	434	216	180	207	532
GAS HANDLING	1886	1874	1897	2066	2098	2243	2188
CHLORIDE PURGE	---	---	---	1475	770	---	---
SO2 ABSORPTION	3992	4210	3969	2352	3612	4128	6524
STACK GAS REHEAT	560	588	588	529	518	---	---
REGENERATION	---	---	82	2188	2460	2382	---
SLUDGE DISPOSAL	753	787	881	---	---	---	195
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1271	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1575	633	---
ESP CREDIT	---	---	---	---	---	---	(3135)
SERVICES, UTILITIES, MISC	460	503	471	606	673	576	378
SLUDGE POND	366	628	551	---	75	---	62
TOTAL DIRECT INVESTMENT	8695	9520	8873	10704	11960	10169	6745
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	783	857	799	963	1076	915	607
CONSTRUCTION EXPENSE	1391	1523	1420	1713	1914	1627	1079
CONTRACTOR FEES	435	476	444	535	598	508	337
CONTINGENCY	2261	2475	2307	2783	3110	3305	2280
ALLOWANCE FOR SHAKEDOWN	1300	1422	1329	1670	1858	1586	1046
INTEREST DURING CONSTRUCTION	2257	2471	2303	2779	3105	2640	1751
LAND	60	69	59	26	26	26	88
WORKING CAPITAL	80	57	66	85	190	66	60
TOTAL CAPITAL INVESTMENT	17260	18871	17599	21258	23837	20843	13993

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 44 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: SERC		PLANT SIZE: 100 MW		COAL: 1.20 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	368	---		351	---	---	---	406
-LIMESTONE	---	92	---	---	103	---	---	---
-SODA ASH	---	---		25	---	1156	102	---
-MAGNESIUM OXIDE	---	---		---	24	---	---	---
-COAL	---	---		---	---	---	134	---
-CATALYST	---	---		---	0	---	1	---
UTILITIES								
-ELECTRICITY	352	376		179	364	343	484	320
-WATER	6	6		6	30	116	63	2
-STEAM	239	220		240	246	773	---	---
-FUEL OIL	---	---		---	302	---	120	---
-NATURAL GAS	---	---		---	---	9	---	---
-HEAT CREDIT	---	---		---	(20)	(0)	(46)	---
TOTAL VARIABLE O&M COST		966	694	801	1049	2396	858	727
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	1
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	126	126		179	238	235	256	126
MAINTENANCE								
-LABOR & MATERIAL	816	893		509	945	1052	893	526
TOTAL FIXED O&M COST		942	1018	688	1183	1287	1149	653
OVERHEAD								
-PLANT	471	509		344	592	644	574	326
-ADMINISTRATIVE	13	13		18	24	24	26	13
-MARKETING	---	---		---	28	2	20	---
BYPRODUCT SALES								
-SULFURIC ACID	---	---		---	(278)	---	---	---
-SULFUR	---	---		---	---	(24)	(203)	---
NET OPERATING COST		2390	2234	1851	2598	4329	2425	1719
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	4.43	4.85		4.52	5.46	6.12	5.35	3.59
-LEVELIZED OPERATING COST (MILL/KWH)	6.43	6.01		4.98	6.99	11.65	6.53	4.63
TOTAL LEVELIZED COST (MILL/KWH)		10.87	10.86	9.50	12.45	17.77	11.88	8.22

TABLE G-1. 65 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: SPP-1 PLANT SIZE: 500 MW COAL: 2.75 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3515	4402	3407	1308	1408	1621	3786
GAS HANDLING	7847	7854	7680	8369	8499	9085	9107
CHLORIDE PURGE	---	---	---	7371	3844	---	---
SO2 ABSORPTION	15235	16067	16777	9919	15191	17359	24768
STACK GAS REHEAT	2333	2305	2305	2172	2140	---	---
REGENERATION	---	---	462	11420	12816	12412	---
SLUDGE DISPOSAL	1963	2050	4629	---	---	---	1110
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9298	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	11957	4807	---
ESP CREDIT	---	---	---	---	---	---	(12251)
SERVICES, UTILITIES, MISC	1854	1961	2116	2991	3351	2717	1591
SLUDGE POND	4709	5414	4309	---	411	---	342
TOTAL DIRECT INVESTMENT	37455	40053	41685	52848	59617	48001	28453
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3371	3605	3752	4756	5366	4320	2561
CONSTRUCTION EXPENSE	5993	6409	6670	8456	9539	7680	4553
CONTRACTOR FEES	1873	2003	2084	2642	2981	2400	1423
CONTINGENCY	9738	10414	10838	13740	15500	15600	10436
ALLOWANCE FOR SHAKEDOWN	5372	5707	6072	8244	9259	7488	4405
INTEREST DURING CONSTRUCTION	9723	10397	10821	13718	15476	12460	7386
LAND	500	608	498	16	16	16	480
WORKING CAPITAL	771	550	724	939	703	629	709
TOTAL CAPITAL INVESTMENT	74795	79745	83144	105360	118456	98595	60405

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 66 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: SPP-1		PLANT SIZE: 500 MW		COAL: 2.75 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESTA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	6132	---	5840	---	---	---	---	6753
-LIMESTONE	---	3111	---	444	---	---	---	---
-SODA ASH	---	---	413	---	1171	1689	---	---
-MAGNESIUM OXIDE	---	---	---	404	---	---	---	---
-COAL	---	---	---	---	---	1232	---	---
-CATALYST	---	---	---	6	---	12	---	---
UTILITIES								
-ELECTRICITY	1806	2101	1127	2390	1871	2660	1756	
-WATER	37	39	39	374	832	409	13	
-STEAM	1316	1387	1317	1354	4246	---	---	
-FUEL OIL	---	---	---	7028	---	2800	---	
-NATURAL GAS	---	---	---	---	1207	---	---	
-HEAT CREDIT	---	---	---	(358)	(58)	(841)	---	
TOTAL VARIABLE O&M COST		9291	5638	8736	11642	9269	7961	8521
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	11
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	363	363	482	694	686	746	363	
MAINTENANCE								
-LABOR & MATERIAL	2756	2928	1622	3690	4146	3332	1693	
TOTAL FIXED O&M COST		3118	3291	2105	4384	4832	4078	2066
OVERHEAD								
-PLANT	1559	1645	1052	2192	2416	2039	1033	
-ADMINISTRATIVE	36	36	48	69	69	75	36	
-MARKETING	---	---	---	503	348	368	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(5026)	---	---	---	
-SULFUR	---	---	---	---	(3478)	(3676)	---	
NET OPERATING COST		14005	11610	11941	13763	13456	10844	11657
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	3.84	4.10	4.27	5.41	6.09	5.06	3.10	
-LEVELIZED OPERATING COST (MILL/KWH)	7.54	6.25	6.43	7.41	7.24	5.84	6.27	
TOTAL LEVELIZED COST (MILL/KWH)		11.38	10.35	10.70	12.82	13.33	10.90	9.38

TABLE G-1. 67 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: SPP-1		PLANT SIZE: 500 MW		COAL: 0.80 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1251	1959	1173	518	490	564	1373
GAS HANDLING	8057	8065	7882	8588	8722	9324	9351
CHLORIDE FURGE	---	---	---	7568	3947	---	---
SO2 ABSORPTION	15619	16473	17230	10186	15599	17826	25391
STACK GAS REHEAT	2395	2364	2364	2229	2197	---	---
REGENERATION	---	---	190	4891	5494	5321	---
SLUDGE DISPOSAL	1200	1254	1975	---	---	---	455
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3349	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4225	1699	---
ESP CREDIT	---	---	---	---	---	---	(12528)
SERVICES, UTILITIES, MISC	1711	1807	1849	2240	2440	2084	1443
SLUDGE POND	1609	1815	1524	---	422	---	352
TOTAL DIRECT INVESTMENT	31842	33736	34187	39570	43537	36817	25836
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2866	3036	3077	3561	3918	3314	2325
CONSTRUCTION EXPENSE	5095	5398	5470	6331	6966	5891	4134
CONTRACTOR FEES	1592	1687	1709	1978	2177	1841	1292
CONTINGENCY	8279	8771	8889	10288	11320	11965	8541
ALLOWANCE FOR SHAKEDOWN	4806	5081	5181	6173	6750	5743	3995
INTEREST DURING CONSTRUCTION	8266	8757	8874	10272	11302	9557	6707
LAND	121	145	121	16	16	16	251
WORKING CAPITAL	379	341	314	448	630	320	278
TOTAL CAPITAL INVESTMENT	63246	66953	67821	78637	86615	75464	53359

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 68 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: SPP-1		PLANT SIZE: 500 MW		COAL: 0.80 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	MELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME		1388	---	1321	---	---	---	1528
-LIMESTONE		---	704	---	444	---	---	---
-SODA ASH		---	---	93	---	1113	382	---
-MAGNESIUM OXIDE		---	---	---	91	---	---	---
-COAL		---	---	---	---	---	279	---
-CATALYST		---	---	---	1	---	3	---
UTILITIES								
-ELECTRICITY		1806	2043	995	1936	1867	2735	1805
-WATER		31	31	36	141	610	342	10
-STEAM		1353	1343	1354	1392	4367	---	---
-FUEL OIL		---	---	---	1590	---	634	---
-NATURAL GAS		---	---	---	---	223	---	---
-HEAT CREDIT		---	---	---	(81)	(11)	(190)	---
TOTAL VARIABLE O&M COST		4578	4121	3801	5515	8170	4184	3344
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	6
LABOR								
-OPERATING, ANALYSIS, SUPERVISION		317	317	424	609	602	653	317
MAINTENANCE								
-LABOR & MATERIAL		2462	2603	1351	2763	3023	2556	1536
TOTAL FIXED O&M COST		2780	2921	1774	3372	3625	3209	1859
OVERHEAD								
-PLANT		1390	1460	887	1686	1812	1604	929
-ADMINISTRATIVE		32	32	42	61	60	65	32
-MARKETING		---	---	---	114	64	83	---
BYPRODUCT SALES								
-SULFURIC ACID		---	---	---	(1137)	---	---	---
-SULFUR		---	---	---	---	(643)	(832)	---
NET OPERATING COST		8779	8534	6504	9609	13088	8314	6164
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL./KWH)		3.25	3.44	3.48	4.04	4.45	3.88	2.74
-LEVELIZED OPERATING COST (MILL./KWH)		4.73	4.59	3.50	5.17	7.04	4.47	3.32
TOTAL LEVELIZED COST (MILL./KWH)		7.97	8.03	6.98	9.21	11.49	8.35	6.06

TABLE G-1. 69 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW REGION: SPP-1 PLANT SIZE: 100 MW COAL: 2.75 % SULFUR							
	LIME	LINESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	1196	1892	1121	498	468	539	1315
GAS HANDLING	2179	2167	2186	2381	2419	2585	2528
CHLORIDE PURGE	---	---	---	1705	889	---	---
SO2 ABSORPTION	4577	4827	4592	2721	4178	4774	7476
STACK GAS REHEAT	647	676	676	611	598	---	---
REGENERATION	---	---	183	4714	5295	5128	---
SLUDGE DISPOSAL	1175	1228	1904	---	---	---	438
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3204	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4038	1623	---
ESP CREDIT	---	---	---	---	---	---	(3543)
SERVICES, UTILITIES, MISC	586	647	640	950	1073	879	493
SLUDGE POND	1534	1729	1455	---	87	---	73
TOTAL DIRECT INVESTMENT	11896	13166	12757	16783	19045	15529	8779
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1071	1185	1148	1511	1714	1398	790
CONSTRUCTION EXPENSE	1903	2107	2041	2685	3047	2485	1405
CONTRACTOR FEES	595	658	638	839	952	776	439
CONTINGENCY	3093	3423	3317	4364	4952	5047	3220
ALLOWANCE FOR SHAKEDOWN	1702	1881	1845	2618	2962	2423	1362
INTEREST DURING CONSTRUCTION	3088	3418	3311	4357	4944	4031	2279
LAND	114	137	114	16	16	16	110
WORKING CAPITAL	166	116	154	200	218	133	150
TOTAL CAPITAL INVESTMENT	23628	26090	25324	33373	37851	31838	18534

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 70 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: SPP-1		PLANT SIZE: 100 MW		COAL: 2.75 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST								
(VARIABLE)								
RAW MATERIAL								
-LIME	1301	---	1239	---	---	---	---	1432
-LIMESTONE	---	660	---	94	---	---	---	---
-SODA ASH	---	---	88	---	1111	---	358	---
-MAGNESIUM OXIDE	---	---	---	86	---	---	---	---
-COAL	---	---	---	---	---	261	---	---
-CATALYST	---	---	---	1	---	3	---	---
UTILITIES								
-ELECTRICITY	416	459	239	519	409	564	372	
-WATER	8	8	8	80	180	87	3	
-STEAM	279	274	279	287	901	---	---	
-FUEL OIL	---	---	---	1491	---	594	---	
-NATURAL GAS	---	---	---	---	205	---	---	
-HEAT CREDIT	---	---	---	(76)	(10)	(178)	---	
TOTAL VARIABLE O&M COST		2004	1401	1853	2481	2796	1688	1807
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	2
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	162	162	225	306	302	330	162	
MAINTENANCE								
-LABOR & MATERIAL	1064	1176	712	1482	1677	1364	685	
TOTAL FIXED O&M COST		1226	1337	938	1788	1979	1693	849
OVERHEAD								
-PLANT	613	669	469	894	990	847	424	
-ADMINISTRATIVE	16	16	23	31	30	33	16	
-MARKETING	---	---	---	107	59	78	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1066)	---	---	---	
-SULFUR	---	---	---	---	(592)	(780)	---	
NET OPERATING COST		3859	3423	3282	4235	5262	3560	3097
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL./KWH)	6.07	6.70	6.50	8.57	9.72	8.18	4.76	
-LEVELIZED OPERATING COST (MILL./KWH)	10.38	9.21	8.83	11.40	14.16	9.58	8.33	
TOTAL LEVELIZED COST (MILL./KWH)		16.45	15.91	15.34	19.97	23.88	17.76	13.09

TABLE G-1. 71 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: SPP-1

PLANT SIZE: 100 MW

COAL: 0.80 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	434	864	394	198	163	188	484
GAS HANDLING	2238	2225	2244	2444	2482	2653	2596
CHLORIDE PURGE	---	---	---	1750	913	---	---
SO2 ABSORPTION	4693	4948	4716	2794	4290	4903	7664
STACK GAS REHEAT	665	693	693	627	614	---	---
REGENERATION	---	---	75	2019	2270	2198	---
SLUDGE DISPOSAL	718	751	812	---	---	---	180
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1154	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1427	574	---
ESP CREDIT	---	---	---	---	---	---	(3623)
SERVICES, UTILITIES, MISC	525	569	536	659	730	631	438
SLUDGE POND	510	564	497	---	90	---	75
TOTAL DIRECT INVESTMENT	9782	10615	9968	11646	12978	11146	7813
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	880	955	897	1048	1168	1003	703
CONSTRUCTION EXPENSE	1565	1698	1595	1863	2076	1783	1250
CONTRACTOR FEES	489	531	498	582	649	557	391
CONTINGENCY	2543	2760	2592	3028	3374	3623	2583
ALLOWANCE FOR SHAKEDOWN	1475	1600	1505	1817	2016	1739	1211
INTEREST DURING CONSTRUCTION	2539	2756	2587	3023	3369	2893	2028
LAND	34	39	34	16	16	16	61
WORKING CAPITAL	83	72	67	96	199	68	59
TOTAL CAPITAL INVESTMENT	19390	21025	19742	23120	25845	22829	16099

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1. 72 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: SPP-1		PLANT SIZE: 100 MW		COAL: 0.80 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							

(VARIABLE)							
RAW MATERIAL							
-LIME	294	---	280	---	---	---	324
-LIMESTONE	---	149	---	94	---	---	---
-SODA ASH	---	---	20	---	1056	81	---
-MAGNESIUM OXIDE	---	---	---	19	---	---	---
-COAL	---	---	---	---	---	59	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	417	447	211	423	408	580	383
-WATER	7	7	8	30	133	72	2
-STEAM	287	264	287	295	926	---	---
-FUEL OIL	---	---	---	337	---	134	---
-NATURAL GAS	---	---	---	---	-1	---	---
-HEAT CREDIT	---	---	---	(17)	(-0)	(40)	---
TOTAL VARIABLE O&M COST	1005	867	806	1182	2523	887	709
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	117	117	167	221	218	237	117
MAINTENANCE							
-LABOR & MATERIAL	926	1005	575	1029	1141	979	609
TOTAL FIXED O&M COST	1043	1121	742	1249	1359	1216	727
OVERHEAD							
-PLANT	521	561	371	625	679	608	363
-ADMINISTRATIVE	12	12	17	22	22	24	12
-MARKETING	---	---	---	24	-0	18	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(241)	---	---	---
-SULFUR	---	---	---	---	(-2)	(176)	---
NET OPERATING COST	2581	2560	1936	2861	4585	2576	1811
LEVELIZED - 30 YEARS							

-LEVELIZED CAPITAL COST (MILL/KWH)	4.98	5.40	5.07	5.94	6.64	5.86	4.14
-LEVELIZED OPERATING COST (MILL/KWH)	6.95	6.89	5.21	7.70	12.34	6.93	4.87
TOTAL LEVELIZED COST (MILL/KWH)	11.93	12.29	10.28	13.64	18.98	12.80	9.01

TABLE G-1. 73 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: SPP-2		PLANT SIZE: 500 MW		COAL: 3.75 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3522	4409	3414	1310	1411	1624	3793
GAS HANDLING	6431	6432	6316	6881	6989	7471	7464
CHLORIDE PURGE	---	---	---	6041	3150	---	---
SO2 ABSORPTION	12620	13310	13723	8116	12433	14208	20530
STACK GAS REHEAT	1912	1903	1903	1783	1755	---	---
REGENERATION	---	---	463	11438	12836	12431	---
SLUDGE DISPOSAL	1965	2052	4636	---	---	---	1112
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9315	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	11979	4816	---
ESP CREDIT	---	---	---	---	---	---	(10350)
SERVICES, UTILITIES, MISC	1587	1686	1827	2693	3033	2433	1353
SLUDGE POND	4718	5425	4317	---	332	---	277
TOTAL DIRECT INVESTMENT	32754	35216	36599	47577	53919	42982	24179
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2948	3169	3294	4282	4853	3868	2176
CONSTRUCTION EXPENSE	5241	5635	5856	7612	8627	6877	3869
CONTRACTOR FEES	1638	1761	1830	2379	2696	2149	1209
CONTINGENCY	8516	9156	9516	12370	14019	13969	9318
ALLOWANCE FOR SHAKEDOWN	4638	4951	5278	7422	8378	6705	3744
INTEREST DURING CONSTRUCTION	8502	9141	9501	12350	13997	11158	6277
LAND	1111	1351	1106	36	36	36	887
WORKING CAPITAL	777	481	741	738	624	595	740
TOTAL CAPITAL INVESTMENT	66125	70861	73720	94766	107149	88340	52399

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 74 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: SPP-2

PLANT SIZE: 500 MW

COAL: 3.75 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	6773	---	6450	---	---	---	7458
-LIMESTONE	---	2911	---	489	---	---	---
-SODA ASH	---	---	427	---	1209	1749	---
-MAGNESIUM OXIDE	---	---	---	425	---	---	---
-COAL	---	---	---	---	---	2015	---
-CATALYST	---	---	---	6	---	20	---
UTILITIES							
-ELECTRICITY	1490	1736	953	2067	1535	2154	1422
-WATER	32	34	32	361	735	363	11
-STEAM	1066	1133	1067	1096	3439	---	---
-FUEL OIL	---	---	---	5140	---	2048	---
-NATURAL GAS	---	---	---	---	1370	---	---
-HEAT CREDIT	---	---	---	(359)	(58)	(844)	---
TOTAL VARIABLE O&M COST	9361	5814	8929	9225	8230	7506	8891
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	9
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	386	386	512	737	729	793	386
MAINTENANCE							
-LABOR & MATERIAL	2380	2541	1419	3322	3752	2984	1439
TOTAL FIXED O&M COST	2766	2927	1931	4059	4480	3777	1834
OVERHEAD							
-PLANT	1383	1484	966	2030	2240	1888	917
-ADMINISTRATIVE	39	39	51	74	73	79	39
-MARKETING	---	---	---	504	349	369	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5039)	---	---	---
-SULFUR	---	---	---	---	(3488)	(3686)	---
NET OPERATING COST	13548	10243	11877	10853	11885	9934	11680
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL./KWH)	3.40	3.64	3.79	4.87	5.50	4.54	2.69
-LEVELIZED OPERATING COST (MILL./KWH)	7.29	5.51	6.39	5.84	6.40	5.35	6.29
TOTAL LEVELIZED COST (MILL./KWH)	10.69	9.15	10.18	10.71	11.90	9.88	8.98

TABLE G-1. 75 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: SPP-2		PLANT SIZE: 500 MW		COAL: 1.05 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1353	2082	1272	556	531	612	1483
GAS HANDLING	7130	7133	6989	7616	7735	8268	8274
CHLORIDE PURGE	---	---	---	6697	3493	---	---
SO2 ABSORPTION	13913	14674	15229	9005	13793	15762	22626
STACK GAS REHEAT	2119	2101	2101	1975	1945	---	---
REGENERATION	---	---	204	5219	5862	5677	---
SLUDGE DISPOSAL	1246	1302	2108	---	---	---	487
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3621	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4575	1839	---
ESP CREDIT	---	---	---	---	---	---	(11295)
SERVICES, UTILITIES, MISC	1546	1638	1674	2081	2276	1929	1295
SLUDGE POND	1749	1975	1652	---	371	---	309
TOTAL DIRECT INVESTMENT	29056	30905	31231	36770	40581	34087	23181
INDIRECT INVESTMENT							
77 ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2615	2781	2811	3309	3652	3068	2086
CONSTRUCTION EXPENSE	4649	4945	4997	5883	6493	5454	3709
CONTRACTOR FEES	1453	1545	1562	1839	2029	1704	1159
CONTINGENCY	7555	8035	8120	9560	10551	11078	7770
ALLOWANCE FOR SHAKEDOWN	4358	4624	4707	5736	6294	5318	3585
INTEREST DURING CONSTRUCTION	7542	8022	8107	9545	10534	8849	6017
LAND	298	358	296	36	36	36	378
WORKING CAPITAL	375	310	318	397	576	305	289
TOTAL CAPITAL INVESTMENT	57900	61526	62148	73076	80746	69899	48175

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 76 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: SPP-2		PLANT SIZE: 500 MW		COAL: 1.05 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	1712	---	1631	---	---	---	---	1886
-LIMESTONE	---	736	---	489	---	---	---	---
-SODA ASH	---	---	108	---	1154	442	---	---
-MAGNESIUM OXIDE	---	---	---	107	---	---	---	---
-COAL	---	---	---	---	---	510	---	---
-CATALYST	---	---	---	1	---	5	---	---
UTILITIES								
-ELECTRICITY	1601	1808	886	1740	1649	2403	1586	
-WATER	28	28	32	141	554	309	9	
-STEAM	1189	1178	1190	1223	3836	---	---	
-FUEL OIL	---	---	---	1300	---	518	---	
-NATURAL GAS	---	---	---	---	292	---	---	
-HEAT CREDIT	---	---	---	(91)	(12)	(213)	---	
TOTAL VARIABLE O&M COST	4530	3750	3846	4910	7472	3973	3481	
(FIXED)								
WASTE DISPOSAL (TRUCKING)								
LABOR	---	---	---	---	---	---	4	
-OPERATING, ANALYSIS, SUPERVISION	323	323	431	620	612	665	323	
MAINTENANCE								
-LABOR & MATERIAL	2233	2369	1231	2567	2819	2366	1378	
TOTAL FIXED O&M COST	2556	2692	1662	3187	3431	3031	1705	
OVERHEAD								
-PLANT	1278	1346	831	1593	1716	1516	853	
-ADMINISTRATIVE	32	32	43	62	61	66	32	
-MARKETING	---	---	---	127	94	93	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1274)	---	---	---	
-SULFUR	---	---	---	---	(743)	(932)	---	
NET OPERATING COST	8397	7321	6383	8606	12011	7748	6071	
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	2.97	3.16	3.19	3.75	4.15	3.59	2.47	
-LEVELIZED OPERATING COST (MILL/KWH)	4.52	4.21	3.44	4.63	6.47	4.17	3.27	
TOTAL LEVELIZED COST (MILL/KWH)	7.49	7.37	6.63	8.39	10.61	7.76	5.74	

TABLE G-1. 77 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: SPP-2 PLANT SIZE: 100 MW COAL: 3.75 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1199	1895	1123	499	469	540	1317
GAS HANDLING	1786	1775	1798	1958	1989	2126	2072
CHLORIDE PURGE	---	---	---	1397	729	---	---
SO2 ABSORPTION	3792	3998	3756	2227	3420	3908	6197
STACK GAS REHEAT	530	558	558	502	490	---	---
REGENERATION	---	---	183	4721	5303	5136	---
SLUDGE DISPOSAL	1176	1229	1906	---	---	---	439
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3209	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4046	1626	---
ESP CREDIT	---	---	---	---	---	---	(2993)
SERVICES, UTILITIES, MISC	509	567	559	871	987	800	422
SLUDGE POND	1537	1732	1458	---	71	---	59
TOTAL DIRECT INVESTMENT	10529	11754	11342	15383	17503	14136	7512
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	948	1058	1021	1384	1575	1272	676
CONSTRUCTION EXPENSE	1685	1881	1815	2461	2800	2262	1202
CONTRACTOR FEES	526	588	567	769	875	707	376
CONTINGENCY	2738	3056	2949	4000	4551	4594	2895
ALLOWANCE FOR SHAKEDOWN	1489	1660	1624	2400	2723	2205	1166
INTEREST DURING CONSTRUCTION	2733	3051	2944	3993	4543	3670	1950
LAND	253	304	252	36	36	36	206
WORKING CAPITAL	167	102	157	157	203	126	157
TOTAL CAPITAL INVESTMENT	21068	23454	22672	30584	34810	29008	16139

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 78 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: SPP-2		PLANT SIZE: 100 MW		COAL: 3.75 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
<hr/>							
OPERATING COST							
<hr/>							
(VARIABLE)							
RAW MATERIAL							
-LIME	1436	---	1368	---	---	---	1582
-LIMESTONE	---	617	---	104	---	---	---
-SODA ASH	---	---	91	---	1147	371	---
-MAGNESIUM OXIDE	---	---	---	90	---	---	---
-COAL	---	---	---	---	---	427	---
-CATALYST	---	---	---	1	---	4	---
UTILITIES							
-ELECTRICITY	343	379	202	448	335	457	302
-WATER	7	7	7	77	159	77	2
-STEAM	226	224	226	232	729	---	---
-FUEL OIL	---	---	---	1090	---	434	---
-NATURAL GAS	---	---	---	---	233	---	---
-HEAT CREDIT	---	---	---	(76)	(10)	(179)	---
TOTAL VARIABLE O&M COST	2012	1228	1894	1967	2594	1592	1886
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	2
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	185	185	255	349	345	377	185
MAINTENANCE							
-LABOR & MATERIAL	930	1037	629	1359	1542	1241	586
TOTAL FIXED O&M COST	1114	1222	884	1708	1887	1619	773
OVERHEAD							
-PLANT	557	511	442	854	944	809	386
-ADMINISTRATIVE	18	18	26	35	35	38	18
-MARKETING	---	---	---	107	59	78	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1069)	---	---	---
-SULFUR	---	---	---	---	(594)	(782)	---
NET OPERATING COST	3703	3078	3245	3602	4925	3354	3064
<hr/>							
LEVELIZED - 30 YEARS							
<hr/>							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.41	6.02	5.82	7.86	8.94	7.45	4.15
-LEVELIZED OPERATING COST (MILL/KWH)	9.96	8.28	8.73	9.69	13.25	9.03	8.24
TOTAL LEVELIZED COST (MILL/KWH)	15.38	14.31	14.56	17.55	22.19	16.48	12.39

TABLE G-1. 79 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: SPP-2		PLANT SIZE: 100 MW		COAL: 1.05 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	469	916	426	213	177	203	522
GAS HANDLING	1980	1968	1990	2167	2201	2353	2297
CHLORIDE PURGE	---	---	---	1549	808	---	---
SO2 ABSORPTION	4180	4408	4168	2470	3793	4335	4830
STACK GAS REHEAT	588	616	616	555	543	---	---
REGENERATION	---	---	81	2154	2422	2346	---
SLUDGE DISPOSAL	746	780	867	---	---	---	192
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1248	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1545	621	---
ESP CREDIT	---	---	---	---	---	---	(3267)
SERVICES, UTILITIES, MISC	478	521	489	621	689	591	394
SLUDGE POND	555	615	540	---	79	---	66
TOTAL DIRECT INVESTMENT	8994	9825	9177	10978	12258	10449	7035
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	810	884	826	988	1103	940	633
CONSTRUCTION EXPENSE	1439	1572	1468	1756	1961	1672	1126
CONTRACTOR FEES	450	491	459	549	613	522	352
CONTINGENCY	2339	2555	2386	2854	3187	3396	2358
ALLOWANCE FOR SHAKEDOWN	1348	1471	1378	1713	1904	1630	1091
INTEREST DURING CONSTRUCTION	2335	2551	2382	2850	3182	2712	1824
LAND	81	94	81	36	36	36	98
WORKING CAPITAL	82	65	67	85	190	65	61
TOTAL CAPITAL INVESTMENT	17879	19508	18225	21809	24434	21424	14580

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 80 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: SPP-2		PLANT SIZE: 100 MW		COAL: 1.05 % SULFUR		
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	363	---	346	---	---	---	400
-LIMESTONE	---	156	---	104	---	---	---
-SODA ASH	---	---	23	---	1094	94	---
-MAGNESIUM OXIDE	---	---	---	23	---	---	---
-COAL	---	---	---	---	---	108	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	370	395	188	380	361	510	336
-WATER	6	6	7	30	121	66	2
-STEAM	252	232	252	259	814	---	---
-FUEL OIL	---	---	---	276	---	110	---
-NATURAL GAS	---	---	---	---	7	---	---
-HEAT CREDIT	---	---	---	(19)	(0)	(45)	---
TOTAL VARIABLE O&M COST	991	789	816	1053	2396	843	738
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	122	122	174	231	229	249	122
MAINTENANCE							
-LABOR & MATERIAL	846	924	527	970	1078	918	549
TOTAL FIXED O&M COST	968	1046	702	1201	1307	1166	672
OVERHEAD							
-PLANT	484	523	351	601	653	583	336
-ADMINISTRATIVE	12	12	17	23	23	25	12
-MARKETING	---	---	---	27	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(270)	---	---	---
-SULFUR	---	---	---	---	(18)	(198)	---
NET OPERATING COST	2456	2370	1886	2634	4363	2439	1758
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.59	5.01	4.68	5.60	6.28	5.50	3.74
-LEVELIZED OPERATING COST (MILL/KWH)	6.61	6.38	5.07	7.09	11.74	6.56	4.73
TOTAL LEVELIZED COST (MILL/KWH)	11.20	11.39	9.76	12.69	18.02	12.07	8.48

TABLE G-1. 81 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: WSCC-1 PLANT SIZE: 500 MW COAL: 1.25 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	770	1345	712	334	297	342	852
GAS HANDLING	7605	7611	7447	8114	8241	8809	8826
CHLORIDE PURGE	---	---	---	7144	3725	---	---
SO2 ABSORPTION	14789	15597	16254	9610	14719	14820	24046
STACK GAS REHEAT	2261	2236	2236	2105	2074	---	---
REGENERATION	---	---	125	3269	3673	3557	---
SLUDGE DISPOSAL	950	993	1318	---	---	---	298
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2061	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2577	1036	---
ESP CREDIT	---	---	---	---	---	---	(11930)
SERVICES, UTILITIES, MISC	1582	1667	1685	1958	2118	1834	1326
SLUDGE POND	956	1069	918	---	397	---	331
TOTAL DIRECT INVESTMENT	28913	30517	30695	34596	37822	32398	23749
INDIRECT INVESTMENT							
83 ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2602	2747	2763	3114	3404	2916	2137
CONSTRUCTION EXPENSE	4626	4883	4911	5535	6051	5184	3800
CONTRACTOR FEES	1446	1526	1535	1730	1891	1620	1187
CONTINGENCY	7517	7934	7981	8995	9834	10529	8049
ALLOWANCE FOR SHAKEDOWN	4415	4654	4697	5397	5860	5054	3672
INTEREST DURING CONSTRUCTION	7505	7922	7968	8980	9818	8410	6165
LAND	174	207	174	44	44	44	612
WORKING CAPITAL	321	329	256	380	576	261	222
TOTAL CAPITAL INVESTMENT	57520	60718	60978	68770	75300	66414	49594

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 82 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-1

PLANT SIZE: 500 MW

COAL: 1.25 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	883	---	841	---	---	---	972
-LIMESTONE	---	787	---	572	---	---	---
-SODA ASH	---	---	41	---	972	169	---
-MAGNESIUM OXIDE	---	---	---	39	---	---	---
-COAL	---	---	---	---	---	112	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	1698	1910	915	1758	1752	2573	1698
-WATER	28	28	34	102	544	339	10
-STEAM	1273	1249	1274	1309	4108	---	---
-FUEL OIL	---	---	---	923	---	368	---
-NATURAL GAS	---	---	---	---	85	---	---
-HEAT CREDIT	---	---	---	(40)	(4)	(94)	---
TOTAL VARIABLE O&M COST	3883	3974	3105	4664	7457	3467	2681
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	5
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	328	328	437	628	621	674	328
MAINTENANCE							
-LABOR & MATERIAL	2261	2383	1217	2416	2625	2249	1411
TOTAL FIXED O&M COST	2589	2711	1654	3044	3246	2923	1744
OVERHEAD							
-PLANT	1294	1356	827	1522	1623	1462	872
-ADMINISTRATIVE	33	33	44	63	62	67	33
-MARKETING	---	---	---	56	23	41	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(561)	---	---	---
-SULFUR	---	---	---	---	(227)	(410)	---
NET OPERATING COST	7799	8074	5631	8788	12184	7550	5331
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL./KWH)	2.95	3.12	3.13	3.53	3.87	3.41	2.55
-LEVELIZED OPERATING COST (MILL./KWH)	4.20	4.35	3.03	4.73	6.56	4.06	2.87
TOTAL LEVELIZED COST (MILL./KWH)	7.15	7.46	6.16	8.26	10.43	7.48	5.42

TABLE G-1. 83 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-1

PLANT SIZE: 500 MW

COAL: 0.95 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1355	2085	1275	557	532	613	1486
GAS HANDLING	7687	7694	7526	8201	8329	8903	8922
CHLORIDE PURGE	---	---	---	7221	3766	---	---
SO2 ABSORPTION	14941	15757	16432	9715	14879	17003	24291
STACK GAS REHEAT	2285	2259	2259	2128	2097	---	---
REGENERATION	---	---	204	5227	5870	5685	---
SLUDGE DISPOSAL	1247	1303	2112	---	---	---	488
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3628	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4583	1843	---
ESP CREDIT	---	---	---	---	---	---	(12039)
SERVICES, UTILITIES, MISC	1651	1746	1788	2201	2403	2043	1389
SLUDGE POND	1752	1979	1655	---	402	---	335
TOTAL DIRECT INVESTMENT	30919	32823	33252	38877	42862	36090	24872
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2783	2954	2993	3499	3858	3248	2238
CONSTRUCTION EXPENSE	4947	5252	5320	6220	6858	5774	3979
CONTRACTOR FEES	1546	1641	1663	1944	2143	1804	1244
CONTINGENCY	8039	8534	8645	10108	11144	11729	8291
ALLOWANCE FOR SHAKEDOWN	4648	4923	5022	6065	6646	5630	3847
INTEREST DURING CONSTRUCTION	8026	8520	8632	10092	11126	9368	6456
LAND	362	435	360	44	44	44	624
WORKING CAPITAL	418	418	354	489	600	322	328
TOTAL CAPITAL INVESTMENT	61688	65501	66241	77337	85281	74010	51879

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 84 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: WSCC-1	PLANT SIZE: 500 MW	COAL: 0.95 % SULFUR				
	LINE	LIMESTONE	DUAL ALKALI	MAGNESA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	2010	---	1915	---	---	---	2214
-LIMESTONE	---	1792	---	572	---	---	---
-SODA ASH	---	---	94	---	999	384	---
-MAGNESIUM OXIDE	---	---	---	89	---	---	---
-COAL	---	---	---	---	---	255	---
-CATALYST	---	---	---	1	---	3	---
UTILITIES							
-ELECTRICITY	1725	1952	955	1869	1781	2603	1718
-WATER	30	30	35	146	593	331	10
-STEAM	1288	1279	1289	1324	4155	---	---
-FUEL OIL	---	---	---	2102	---	837	---
-NATURAL GAS	---	---	---	---	281	---	---
-HEAT CREDIT	---	---	---	(91)	(12)	(214)	---
TOTAL VARIABLE O&M COST	5053	5053	4287	6013	7797	4199	3942
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	5
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	321	321	428	615	608	660	321
MAINTENANCE							
-LABOR & MATERIAL	2381	2322	1312	2714	2977	2505	1478
TOTAL FIXED O&M COST	2702	2843	1740	3330	3585	3165	1805
OVERHEAD							
-PLANT	1351	1422	870	1665	1792	1583	902
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	128	75	93	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1277)	---	---	---
-SULFUR	---	---	---	---	(745)	(934)	---
NET OPERATING COST	9139	9349	6940	9919	12564	8172	6681
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.17	3.36	3.40	3.97	4.38	3.80	2.67
-LEVELIZED OPERATING COST (MILL/KWH)	4.92	5.03	3.74	5.34	6.76	4.40	3.60
TOTAL LEVELIZED COST (MILL/KWH)	8.09	8.40	7.14	9.31	11.14	8.20	6.26

TABLE G-1. 85 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: WSCC-1	PLANT SIZE: 100 MW	COAL: 1.25 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	270	600	241	128	99	114	303
GAS HANDLING	2112	2100	2120	2309	2345	2507	2450
CHLORIDE PURGE	---	---	---	1652	862	---	---
SO2 ABSORPTION	4443	4685	4449	2636	4048	4626	7258
STACK GAS REHEAT	627	656	656	592	579	---	---
REGENERATION	---	---	49	1349	1518	1470	---
SLUDGE DISPOSAL	569	595	542	---	---	---	118
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	710	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	870	350	---
ESP CREDIT	---	---	---	---	---	---	(3450)
SERVICES, UTILITIES, MISC	481	518	483	563	619	544	401
SLUDGE POND	300	329	296	---	84	---	70
TOTAL DIRECT INVESTMENT	8802	9483	8837	9940	11024	9610	7149
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	792	854	795	895	992	865	643
CONSTRUCTION EXPENSE	1408	1517	1414	1590	1764	1538	1144
CONTRACTOR FEES	440	474	442	497	551	480	357
CONTINGENCY	2289	2466	2298	2584	2866	3123	2423
ALLOWANCE FOR SHAKEDOWN	1343	1446	1349	1551	1711	1499	1108
INTEREST DURING CONSTRUCTION	2285	2462	2294	2580	2862	2495	1856
LAND	59	65	58	44	44	44	151
WORKING CAPITAL	71	69	54	82	179	55	47
TOTAL CAPITAL INVESTMENT	17489	18837	17541	19763	21994	19709	14880

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 86 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: WSCC-1		PLANT SIZE: 100 MW		COAL: 1.25 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	187	---		178	---	---	---	206
-LIMESTONE	---	167	---	---	122	---	---	---
-SODA ASH	---	---		9	---	922	36	---
-MAGNESIUM OXIDE	---	---		---	8	---	---	---
-COAL	---	---		---	---	---	24	---
-CATALYST	---	---		---	0	---	0	---
UTILITIES								
-ELECTRICITY	392	418		194	384	383	546	360
-WATER	6	6		7	22	119	72	2
-STEAM	270	245		270	278	871	---	---
-FUEL OIL	---	---		---	196	---	78	---
-NATURAL GAS	---	---		---	---	-33	---	---
-HEAT CREDIT	---	---		---	(8)	(-1)	(20)	---
TOTAL VARIABLE O&M COST		855	836	659	1001	2264	735	569
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	1
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	127	127		180	240	237	258	127
MAINTENANCE								
-LABOR & MATERIAL	845	909		514	878	969	844	557
TOTAL FIXED O&M COST		971	1036	695	1118	1206	1102	685
OVERHEAD								
-PLANT	486	518		347	559	603	551	343
-ADMINISTRATIVE	13	13		18	24	24	26	13
-MARKETING	---	---		---	12	-9	9	---
BYPRODUCT SALES								
-SULFURIC ACID	---	---		---	(119)	---	---	---
-SULFUR	---	---		---	---	(-87)	(87)	---
NET OPERATING COST		2325	2403	1719	2595	4175	2336	1609
LEVELIZED - 30 YEARS								

-LEVELIZED CAPITAL COST (MILL./KWH)	4.49	4.84		4.51	5.08	5.65	5.06	3.82
-LEVELIZED OPERATING COST (MILL./KWH)	6.26	6.47		4.62	6.98	11.24	6.29	4.33
TOTAL LEVELIZED COST (MILL./KWH)		10.75	11.31	9.13	12.06	16.89	11.35	8.15

TABLE 0-1. 87 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: WSCC-1		PLANT SIZE: 100 MW		COAL: 0.95 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	469	918	427	213	177	204	523
GAS HANDLING	2135	2123	2142	2333	2370	2534	2477
CHLORIDE PURGE	---	---	---	1670	871	---	---
SO2 ABSORPTION	4489	4733	4498	2665	4092	4676	7332
STACK GAS REHEAT	634	663	663	599	586	---	---
REGENERATION	---	---	81	2158	2425	2349	---
SLUDGE DISPOSAL	747	781	868	---	---	---	193
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1250	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1548	622	---
ESP CREDIT	---	---	---	---	---	---	(3482)
SERVICES, UTILITIES, MISC	508	553	521	653	724	623	423
SLUDGE POND	556	616	341	---	85	---	71
TOTAL DIRECT INVESTMENT	9538	10387	9741	11541	12879	11008	7536
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	858	935	877	1039	1159	991	678
CONSTRUCTION EXPENSE	1526	1662	1559	1847	2061	1761	1206
CONTRACTOR FEES	477	519	487	577	644	550	377
CONTINGENCY	2480	2701	2533	3001	3349	3578	2512
ALLOWANCE FOR SHAKEDOWN	1432	1559	1465	1800	2001	1717	1169
INTEREST DURING CONSTRUCTION	2476	2696	2529	2996	3343	2858	1956
LAND	98	114	98	44	44	44	154
WORKING CAPITAL	91	88	75	105	185	68	69
TOTAL CAPITAL INVESTMENT	18978	20660	19363	22949	25664	22575	15658

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 88 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1930 DOLLARS

RUN1.0045/13/81

APPLICATION: NEW		REGION: WSCC-1		PLANT SIZE: 100 MW		COAL: 0.95 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LINE	426	---	406	---	---	---	470
-LIMESTONE	---	380	---	122	---	---	---
-SODA ASH	---	---	20	---	948	81	---
-MAGNESIUM OXIDE	---	---	---	19	---	---	---
-COAL	---	---	---	---	---	54	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	398	427	203	408	390	552	364
-WATER	6	6	7	31	130	70	2
-STEAM	273	251	273	281	881	---	---
-FUEL OIL	---	---	---	446	---	178	---
-NATURAL GAS	---	---	---	---	7	---	---
-HEAT CREDIT	---	---	---	(19)	(0)	(45)	---
TOTAL VARIABLE O&M COST	1104	1065	909	1287	2355	891	836
(FIXED)							
WASTE DISPOSAL (TRUCKING)							
LABOR	---	---	---	---	---	---	1
-OPERATING, ANALYSIS, SUPERVISION	120	120	171	227	225	244	120
MAINTENANCE							
-LABOR & MATERIAL	899	979	561	1019	1132	967	588
TOTAL FIXED O&M COST	1019	1099	732	1246	1357	1211	709
OVERHEAD							
-PLANT	510	549	366	623	678	605	354
-ADMINISTRATIVE	12	12	17	23	22	24	12
-MARKETING	---	---	---	27	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(271)	---	---	---
-SULFUR	---	---	---	---	(19)	(198)	---
NET OPERATING COST	2645	2725	2024	2936	4396	2553	1911
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.87	5.31	4.97	5.89	6.59	5.80	4.02
-LEVELIZED OPERATING COST (MILL/KWH)	7.12	7.33	5.45	7.90	11.83	6.87	5.14
TOTAL LEVELIZED COST (MILL/KWH)	11.99	12.64	10.42	13.80	18.42	12.67	9.16

TABLE G-1. 89 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW REGION: WSCC-2 PLANT SIZE: 500 MW COAL: 0.95 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1345	2073	1245	553	528	608	1475
GAS HANDLING	7772	7779	7608	8290	8419	9000	9020
CHLORIDE PURGE	---	---	---	7301	3808	---	---
SO2 ABSORPTION	15097	15922	16615	9823	15045	17192	24544
STACK GAS REHEAT	2310	2283	2283	2151	2120	---	---
REGENERATION	---	---	203	3195	5835	5651	---
SLUDGE DISPOSAL	1243	1299	2099	---	---	---	485
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3601	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4549	1829	---
ESP CREDIT	---	---	---	---	---	---	(12152)
SERVICES, UTILITIES, MISC	1666	1761	1804	2215	2418	2057	1402
SLUDGE POND	1738	1963	1643	---	406	---	339
TOTAL DIRECT INVESTMENT	31172	33080	33520	39129	43128	36336	25114
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2805	2977	3017	3522	3882	3270	2260
CONSTRUCTION EXPENSE	4988	5293	5363	6261	6900	5814	4018
CONTRACTOR FEES	1559	1654	1676	1956	2156	1817	1256
CONTINGENCY	8105	8601	8715	10174	11213	11809	8372
ALLOWANCE FOR SHAKEDOWN	4689	4964	5065	6104	6687	5668	3884
INTEREST DURING CONSTRUCTION	8092	8587	8701	10157	11195	9432	6519
LAND	177	212	176	22	22	22	249
WORKING CAPITAL	382	359	319	497	607	328	286
TOTAL CAPITAL INVESTMENT	61968	65728	66553	77821	85790	74497	51959

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 90 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: WSCC-2		PLANT SIZE: 500 MW		COAL: 0.95 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	1542	---	---	1468	---	---	---	1698
-LIMESTONE	---	1043	---	---	444	---	---	---
-SODA ASH	---	---	---	92	---	990	376	---
-MAGNESIUM OXIDE	---	---	---	---	94	---	---	---
-COAL	---	---	---	---	---	---	228	---
-CATALYST	---	---	---	---	1	---	2	---
UTILITIES								
-ELECTRICITY	1744	1973	---	965	1887	1801	2633	1738
-WATER	30	30	---	35	146	598	335	10
-STEAM	1303	1294	---	1304	1340	4203	---	---
-FUEL OIL	---	---	---	---	2287	---	911	---
-NATURAL GAS	---	---	---	---	---	302	---	---
-HEAT CREDIT	---	---	---	---	(90)	(12)	(212)	---
TOTAL VARIABLE O&M COST	4619	4340	---	3864	6108	7882	4274	3446
(FIXED)								
WASTE DISPOSAL (TRUCKING)								
LABOR	---	---	---	---	---	---	---	4
-OPERATING, ANALYSIS, SUPERVISION	321	321	---	428	615	608	660	321
MAINTENANCE								
-LABOR & MATERIAL	2402	2543	---	1323	2732	2995	2522	1493
TOTAL FIXED O&M COST	2723	2864	---	1751	3347	3603	3182	1818
OVERHEAD								
-PLANT	1362	1432	---	875	1674	1802	1591	909
-ADMINISTRATIVE	32	32	---	43	62	61	66	32
-MARKETING	---	---	---	---	126	74	92	---
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	---	(1264)	---	---	---
-SULFUR	---	---	---	---	---	(735)	(924)	---
NET OPERATING COST	8736	8569	---	6533	10054	12686	8282	6205
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	3.18	3.38	---	3.42	4.00	4.41	3.83	2.67
-LEVELIZED OPERATING COST (MILL/KWH)	4.70	4.67	---	3.52	5.41	6.83	4.46	3.34
TOTAL LEVELIZED COST (MILL/KWH)	7.89	8.04	---	6.94	9.41	11.24	8.28	6.01

TABLE G-1. 91 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: WSCC-2

PLANT SIZE: 500 MW

COAL: 0.50 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	865	1471	802	371	335	386	956
GAS HANDLING	7793	7800	7628	8312	8442	9024	9045
CHLORIDE PURGE	---	---	---	7320	3818	---	---
SO2 ABSORPTION	15135	15963	16661	9850	15085	17239	24607
STACK GAS REHEAT	2317	2289	2289	2157	2125	---	---
REGENERATION	---	---	138	3602	4047	3919	---
SLUDGE DISPOSAL	1005	1051	1453	---	---	---	330
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2317	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2903	1167	---
ESP CREDIT	---	---	---	---	---	---	(12180)
SERVICES, UTILITIES, MISC.	1627	1714	1738	2036	2205	1904	1365
SLUDGE POND	1084	1215	1038	---	408	---	340
TOTAL DIRECT INVESTMENT	29826	31503	31748	35965	39368	33638	24463
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2684	2835	2857	3237	3543	3027	2202
CONSTRUCTION EXPENSE	4772	5040	5080	5754	6299	5382	3914
CONTRACTOR FEES	1491	1575	1587	1798	1968	1682	1223
CONTINGENCY	7755	8191	8254	9351	10236	10932	7950
ALLOWANCE FOR SHAKEDOWN	4545	4793	4849	5611	6101	5248	3782
INTEREST DURING CONSTRUCTION	7742	8178	8241	9336	10219	8732	4350
LAND	99	118	99	22	22	22	208
WORKING CAPITAL	322	316	256	401	591	277	220
TOTAL CAPITAL INVESTMENT	59237	62549	62971	71474	78347	68941	50312

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1. 92 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: WSCC-2		PLANT SIZE: 500 MW		COAL: 0.50 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							

(VARIABLE)							
RAW MATERIAL							
-LINE	812	---	773	---	---	---	894
-LIMESTONE	---	549	---	444	---	---	---
-SODA ASH	---	---	48	---	968	198	---
-MAGNESIUM OXIDE	---	---	---	49	---	---	---
-COAL	---	---	---	---	---	120	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	1742	1961	943	1814	1798	2641	1743
-WATER	29	29	35	110	563	318	10
-STEAM	1306	1285	1307	1344	4215	---	---
-FUEL OIL	---	---	---	1204	---	480	---
-NATURAL GAS	---	---	---	---	124	---	---
-HEAT CREDIT	---	---	---	(47)	(5)	(111)	---
TOTAL VARIABLE O&M COST	3889	3824	3107	4918	7664	3646	2646
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	3
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	311	311	415	596	589	639	311
MAINTENANCE							
-LABOR & MATERIAL	2327	2455	1258	2511	2733	2335	1454
TOTAL FIXED O&M COST	2638	2765	1673	3107	3321	2974	1768
OVERHEAD							
-PLANT	1319	1383	836	1553	1661	1487	884
-ADMINISTRATIVE	31	31	41	60	59	64	31
-MARKETING	---	---	---	67	30	49	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(665)	---	---	---
-SULFUR	---	---	---	---	(302)	(486)	---
NET OPERATING COST	7877	3004	5657	9039	12433	7733	5329
LEVELIZED - 30 YEARS							

-LEVELIZED CAPITAL COST (MILL/KWH)	3.04	3.21	3.23	3.67	4.02	3.54	2.58
-LEVELIZED OPERATING COST (MILL/KWH)	4.24	4.31	3.04	4.87	6.69	4.16	2.87
TOTAL LEVELIZED COST (MILL/KWH)	7.28	7.52	6.28	8.54	10.72	7.70	5.45

TABLE G-1. 93 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-2

PLANT SIZE: 100 MW

COAL: 0.95 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	466	912	424	212	176	202	520
GAS HANDLING	2159	2146	2166	2359	2396	2561	2504
CHLORIDE PURGE	---	---	---	1689	881	---	---
SO2 ABSORPTION	4536	4783	4548	2695	4138	4728	7409
STACK GAS REHEAT	641	670	670	605	592	---	---
REGENERATION	---	---	80	2144	2411	2335	---
SLUDGE DISPOSAL	744	778	863	---	---	---	191
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1241	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1536	618	---
ESP CREDIT	---	---	---	---	---	---	(3514)
SERVICES, UTILITIES, MISC	513	557	525	657	728	627	427
SLUDGE POND	552	611	537	---	86	---	72
TOTAL DIRECT INVESTMENT	9610	10458	9813	11601	12943	11071	7607
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	865	941	883	1044	1165	996	685
CONSTRUCTION EXPENSE	1538	1673	1570	1856	2071	1771	1217
CONTRACTOR FEES	480	523	491	580	647	554	380
CONTINGENCY	2499	2719	2551	3016	3365	3598	2536
ALLOWANCE FOR SHAKEDOWN	1444	1570	1477	1810	2011	1727	1180
INTEREST DURING CONSTRUCTION	2495	2715	2547	3011	3360	2874	1975
LAND	48	56	48	22	22	22	63
WORKING CAPITAL	84	76	68	106	186	70	61
TOTAL CAPITAL INVESTMENT	19061	20731	19447	23046	25769	22682	15704

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.-94 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-2

PLANT SIZE: 100 MW

COAL: 0.95 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LINE	327	---	311	---	---	---	360
-LIMESTONE	---	221	---	94	---	---	---
-SODA ASH	---	---	20	---	939	80	---
-MAGNESIUM OXIDE	---	---	---	20	---	---	---
-COAL	---	---	---	---	---	48	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	403	431	205	412	394	558	369
-WATER	6	6	7	31	131	71	2
-STEAM	274	254	277	284	891	---	---
-FUEL OIL	---	---	---	485	---	193	---
-NATURAL GAS	---	---	---	---	7	---	---
-HEAT CREDIT	---	---	---	(19)	(0)	(45)	---
TOTAL VARIABLE O&M COST	1012	713	820	1308	2362	907	731
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	120	120	171	227	225	244	120
MAINTENANCE							
-LABOR & MATERIAL	907	586	565	1025	1138	972	593
TOTAL FIXED O&M COST	1027	1106	736	1252	1363	1216	714
OVERHEAD							
-PLANT	513	553	368	626	681	608	357
-ADMINISTRATIVE	12	12	17	23	22	24	12
-MARKETING	---	---	---	27	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(268)	---	---	---
-SULFUR	---	---	---	---	(17)	(196)	---
NET OPERATING COST	2564	2564	1941	2967	4413	2579	1814
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.90	5.32	5.00	5.92	6.62	5.83	4.03
-LEVELIZED OPERATING COST (MILL/KWH)	6.90	6.96	5.22	7.98	11.88	6.94	4.88
TOTAL LEVELIZED COST (MILL/KWH)	11.80	12.28	10.22	13.90	18.50	12.77	8.92

TABLE G-1. 95 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: WSCC-2		PLANT SIZE: 100 MW		COAL: 0.50 % SULFUR		
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	302	655	271	142	111	128	339
GAS HANDLING	2164	2152	2171	2365	2402	2568	2511
CHLORIDE PURGE	---	---	---	1693	883	---	---
SO2 ABSORPTION	4547	4795	4560	2702	4149	4741	7427
STACK GAS REHEAT	643	672	672	607	594	---	---
REGENERATION	---	---	55	1487	1672	1619	---
SLUDGE DISPOSAL	602	629	597	---	---	---	130
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	798	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	980	394	---
ESP CREDIT	---	---	---	---	---	---	(3522)
SERVICES, UTILITIES, MISC	496	534	500	588	648	567	413
SLUDGE POND	341	375	336	---	86	---	72
TOTAL DIRECT INVESTMENT	9095	9812	9162	10382	11526	10018	7370
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
97 ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	819	883	825	934	1037	902	663
CONSTRUCTION EXPENSE	1455	1570	1466	1661	1844	1603	1179
CONTRACTOR FEES	455	491	458	519	576	501	369
CONTINGENCY	2365	2551	2382	2699	2997	3256	2395
ALLOWANCE FOR SHAKEDOWN	1385	1493	1396	1620	1789	1563	1143
INTEREST DURING CONSTRUCTION	2361	2547	2378	2695	2992	2600	1913
LAND	32	36	32	22	22	22	55
WORKING CAPITAL	71	66	54	86	181	59	47
TOTAL CAPITAL INVESTMENT	18036	19449	18152	20619	22964	20522	15133

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1. 96 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW		REGION: WSCC-2		PLANT SIZE: 100 MW		COAL: 0.50 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	172	---	164	---	---	---	---	190
-LIMESTONE	---	116	---	94	---	---	---	---
-SODA ASH	---	---	10	---	919	42	---	---
-MAGNESIUM OXIDE	---	---	---	10	---	---	---	---
-COAL	---	---	---	---	---	25	---	---
-CATALYST	---	---	---	0	---	0	---	---
UTILITIES								
-ELECTRICITY	402	429	200	396	393	560	370	
-WATER	6	6	7	24	123	67	2	
-STEAM	277	252	277	285	894	---	---	
-FUEL OIL	---	---	---	255	---	102	---	
-NATURAL GAS	---	---	---	---	-30	---	---	
-HEAT CREDIT	---	---	---	(10)	(-1)	(24)	---	
TOTAL VARIABLE O&M COST	857	804	659	1055	2301	773	561	
(FIXED)								
WASTE DISPOSAL (TRUCKING)								
LABOR	---	---	---	---	---	---	1	
-OPERATING, ANALYSIS, SUPERVISION	110	110	158	207	205	223	110	
MAINTENANCE								
-LABOR & MATERIAL	870	939	532	917	1013	880	575	
TOTAL FIXED O&M COST	980	1048	690	1124	1218	1102	685	
OVERHEAD								
-PLANT	490	524	345	562	609	551	342	
-ADMINISTRATIVE	11	11	16	21	21	22	11	
-MARKETING	---	---	---	14	-7	10	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(141)	---	---	---	
-SULFUR	---	---	---	---	(-72)	(103)	---	
NET OPERATING COST	2339	2387	1710	2636	4213	2356	1599	
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL./KWH)	4.63	5.00	4.66	5.30	5.90	5.27	3.89	
-LEVELIZED OPERATING COST (MILL./KWH)	6.29	6.42	4.60	7.09	11.34	6.34	4.30	
TOTAL LEVELIZED COST (MILL./KWH)	10.93	11.42	9.26	12.39	17.24	11.61	8.19	

TABLE G-1. 97 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW REGION: WSCC-3 PLANT SIZE: 500 MW COAL: 1.15 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELL-MAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	1368	2100	1287	562	537	619	1500
GAS HANDLING	7203	7207	7060	7493	7813	8352	8360
CHLORIDE PURGE	---	---	---	6766	3529	---	---
SO2 ABSORPTION	14049	14817	15387	9098	13936	15925	22846
STACK GAS REHEAT	2141	2122	2122	1995	1965	---	---
REGENERATION	---	---	206	5267	5915	5728	---
SLUDGE DISPOSAL	1253	1309	2128	---	---	---	492
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3661	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4626	1860	---
ESP CREDIT	---	---	---	---	---	---	(11393)
SERVICES, UTILITIES, MISC	1561	1653	1691	2102	2299	1949	1308
SLUDGE POND	1769	1998	1671	---	375	---	312
TOTAL DIRECT INVESTMENT	29344	31206	31552	37143	40995	34433	23425
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2641	2809	2840	3343	3690	3099	2108
CONSTRUCTION EXPENSE	4695	4993	5048	5943	6559	5509	3748
CONTRACTOR FEES	1467	1560	1578	1857	2050	1722	1171
CONTINGENCY	7629	8114	8203	9657	10659	11191	7896
ALLOWANCE FOR SHAKEDOWN	4401	4668	4755	5794	6358	5371	3623
INTEREST DURING CONSTRUCTION	7617	8101	8190	9642	10642	8938	6081
LAND	460	554	458	55	55	55	614
WORKING CAPITAL	355	394	299	452	602	317	266
TOTAL CAPITAL INVESTMENT	58608	62398	62923	73887	81609	70635	48931

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1. 98 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-3

PLANT SIZE: 500 MW

COAL: 1.15 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1442	---	1373	---	---	---	1588
-LIMESTONE	---	1709	---	405	---	---	---
-SODA ASH	---	---	120	---	1263	492	---
-MAGNESIUM OXIDE	---	---	---	96	---	---	---
-COAL	---	---	---	---	---	292	---
-CATALYST	---	---	---	2	---	3	---
UTILITIES							
-ELECTRICITY	1618	1827	895	1760	1666	2429	1603
-WATER	28	28	33	143	561	316	10
-STEAM	1202	1192	1203	1236	3878	---	---
-FUEL OIL	---	---	---	2023	---	806	---
-NATURAL GAS	---	---	---	---	432	---	---
-HEAT CREDIT	---	---	---	(92)	(13)	(217)	---
TOTAL VARIABLE O&M COST	4290	4756	3624	5572	7788	4121	3201
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	4
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	326	326	434	624	617	669	326
MAINTENANCE							
-LABOR & MATERIAL	2255	2392	1244	2593	2847	2390	1392
TOTAL FIXED O&M COST	2580	2718	1678	3217	3464	3060	1722
OVERHEAD							
-PLANT	1290	1359	839	1609	1732	1530	861
-ADMINISTRATIVE	33	33	43	62	62	67	33
-MARKETING	---	---	---	129	76	95	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1294)	---	---	---
-SULFUR	---	---	---	---	(758)	(947)	---
NET OPERATING COST	8193	8665	6185	9295	12364	7926	5817
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.01	3.21	3.23	3.80	4.19	3.63	2.51
-LEVELIZED OPERATING COST (MILL/KWH)	4.41	4.77	3.33	5.00	6.65	4.27	3.13
TOTAL LEVELIZED COST (MILL/KWH)	7.42	7.98	6.56	8.80	10.85	7.89	5.64

TABLE G-1. 99 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW	REGION: WSCC-3	PLANT SIZE: 500 MW	COAL: 0.55 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	824	1416	763	355	318	366	911
GAS HANDLING	7231	7235	7087	7722	7843	8384	8392
CHLORIDE PURGE	---	---	---	6792	3542	---	---
SO2 ABSORPTION	14101	14871	15448	9134	13991	15988	22930
STACK GAS REHEAT	2149	2130	2130	2003	1973	---	---
REGENERATION	---	---	132	3457	3885	3762	---
SLUDGE DISPOSAL	981	1026	1394	---	---	---	316
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2205	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2760	1110	---
ESP CREDIT	---	---	---	---	---	---	(11431)
SERVICES, UTILITIES, MISC	1517	1601	1617	1900	2059	1777	1267
SLUDGE POND	1028	1151	986	---	376	---	314
TOTAL DIRECT INVESTMENT	27832	29430	29558	33570	36748	31387	22699
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2505	2649	2660	3021	3307	2825	2043
CONSTRUCTION EXPENSE	4453	4709	4729	5371	5880	5022	3632
CONTRACTOR FEES	1392	1472	1478	1678	1837	1569	1135
CONTINGENCY	7236	7652	7685	8728	9554	10201	7398
ALLOWANCE FOR SHAKEDOWN	4239	4476	4512	5237	5695	4896	3510
INTEREST DURING CONSTRUCTION	7225	7640	7673	8714	9539	8147	5892
LAND	238	283	237	55	55	55	497
WORKING CAPITAL	293	318	233	358	578	258	197
TOTAL CAPITAL INVESTMENT	55412	58628	58764	66732	73193	64360	47004

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.100 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-3

PLANT SIZE: 500 MW

COAL: 0.55 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	690	---	657	---	---	---	759
-LIMESTONE	---	818	---	405	---	---	---
-SODA ASH	---	---	57	---	1232	235	---
-MAGNESIUM OXIDE	---	---	---	46	---	---	---
-COAL	---	---	---	---	---	140	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	1616	1815	871	1679	1664	2439	1610
-WATER	27	27	32	102	522	296	9
-STEAM	1207	1183	1208	1241	3894	---	---
-FUEL OIL	---	---	---	968	---	385	---
-NATURAL GAS	---	---	---	---	153	---	---
-HEAT CREDIT	---	---	---	(44)	(4)	(104)	---
TOTAL VARIABLE O&M COST	3539	3842	2826	4398	7460	3393	2379
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	3
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	312	312	416	598	591	641	312
MAINTENANCE							
-LABOR & MATERIAL	2171	2293	1171	2344	2551	2179	1349
TOTAL FIXED O&M COST	2483	2604	1587	2942	3142	2820	1664
OVERHEAD							
-PLANT	1241	1302	794	1471	1571	1410	832
-ADMINISTRATIVE	31	31	42	60	59	64	31
-MARKETING	---	---	---	62	27	45	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(619)	---	---	---
-SULFUR	---	---	---	---	(268)	(453)	---
NET OPERATING COST	7295	7779	5248	8313	11990	7279	4906
LEVELIZED - 30 YEARS	-----	-----	-----	-----	-----	-----	-----
-LEVELIZED CAPITAL COST (MILL/KWH)	2.85	3.01	3.02	3.43	3.76	3.31	2.41
-LEVELIZED OPERATING COST (MILL/KWH)	3.93	4.19	2.82	4.47	6.45	3.92	2.64
TOTAL LEVELIZED COST (MILL/KWH)	6.77	7.20	5.84	7.90	10.21	7.22	5.06

TABLE G-1.101 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-3

PLANT SIZE: 100 MW

COAL: 1.15 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	474	924	431	215	179	206	528
GAS HANDLING	2001	1989	2010	2189	2223	2377	2321
CHLORIDE PURGE	---	---	---	1565	816	---	---
SO2 ABSORPTION	4221	4451	4212	2496	3833	4380	6896
STACK GAS REHEAT	594	623	623	561	549	---	---
REGENERATION	---	---	82	2174	2444	2367	---
SLUDGE DISPOSAL	750	784	875	---	---	---	194
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1261	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1562	628	---
ESP CREDIT	---	---	---	---	---	---	(3295)
SERVICES, UTILITIES, MISC	482	526	494	628	696	597	399
SLUDGE FOND	562	622	547	---	80	---	66
TOTAL DIRECT INVESTMENT	9083	9919	9272	11089	12382	10554	7108
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	817	893	834	998	1114	950	640
CONSTRUCTION EXPENSE	1453	1587	1483	1774	1981	1689	1137
CONTRACTOR FEES	454	496	464	554	619	528	355
CONTINGENCY	2362	2579	2411	2883	3219	3430	2396
ALLOWANCE FOR SHAKEDOWN	1361	1485	1392	1730	1924	1646	1102
INTEREST DURING CONSTRUCTION	2358	2575	2407	2878	3214	2740	1845
LAND	125	145	124	55	55	55	157
WORKING CAPITAL	78	83	63	97	200	67	56
TOTAL CAPITAL INVESTMENT	18090	19760	18450	22058	24709	21660	14798

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.102 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: WSCC-3		PLANT SIZE: 100 MW		COAL: 1.15 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	306	---	---	291	---	---	---	337
-LIMESTONE	---	363	---	---	86	---	---	---
-SODA ASH	---	---	---	25	---	1198	104	---
-MAGNESIUM OXIDE	---	---	---	---	20	---	---	---
-COAL	---	---	---	---	---	---	62	---
-CATALYST	---	---	---	---	0	---	1	---
UTILITIES								
-ELECTRICITY	373	399	190	384	364	515	340	
-WATER	6	6	7	31	122	67	2	
-STEAM	255	234	255	262	822	---	---	
-FUEL OIL	---	---	---	429	---	171	---	
-NATURAL GAS	---	---	---	---	12	---	---	
-HEAT CREDIT	---	---	---	(20)	(0)	(46)	---	
TOTAL VARIABLE O&M COST	940	1002	769	1193	2520	874	679	
(FIXED)								
WASTE DISPOSAL (TRUCKING)								
LABOR	---	---	---	---	---	---	1	
-OPERATING, ANALYSIS, SUPERVISION	125	125	177	236	233	254	125	
MAINTENANCE								
-LABOR & MATERIAL	854	932	533	979	1089	927	554	
TOTAL FIXED O&M COST	979	1057	710	1215	1322	1180	680	
OVERHEAD								
-PLANT	489	528	355	608	661	590	340	
-ADMINISTRATIVE	12	12	18	24	23	25	12	
-MARKETING	---	---	---	27	2	20	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(275)	---	---	---	
-SULFUR	---	---	---	---	(21)	(201)	---	
NET OPERATING COST	2421	2800	1851	2792	4507	2489	1711	
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	4.65	5.08	4.74	5.67	6.35	5.56	3.80	
-LEVELIZED OPERATING COST (MILL/KWH)	6.51	7.00	4.98	7.51	12.13	6.70	4.60	
TOTAL LEVELIZED COST (MILL/KWH)	11.16	12.07	9.72	13.18	18.48	12.26	8.41	

TABLE G-1.103 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW

REGION: WSCC-3

PLANT SIZE: 100 MW

COAL: 0.55 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	288	631	258	136	106	122	323
GAS HANDLING	2008	1996	2017	2197	2232	2386	2330
CHLORINE PURGE	---	---	---	1571	819	---	---
SO2 ABSORPTION	4237	4467	4228	2506	3848	4397	6921
STACK GAS REHEAT	596	625	625	563	551	---	---
REGENERATION	---	---	52	1427	1605	1554	---
SLUDGE DISPOSAL	587	614	573	---	---	---	125
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	760	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	932	375	---
ESP CREDIT	---	---	---	---	---	---	(3306)
SERVICES, UTILITIES, MISC	463	500	465	550	606	530	384
SLUDGE POND	323	355	319	---	80	---	67
TOTAL DIRECT INVESTMENT	8503	9189	8538	9710	10779	9364	6843
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	765	827	768	874	970	843	616
CONSTRUCTION EXPENSE	1360	1470	1366	1554	1725	1498	1095
CONTRACTOR FEES	425	459	427	486	539	468	342
CONTINGENCY	2211	2389	2220	2525	2803	3043	2230
ALLOWANCE FOR SHUTDOWN	1294	1398	1300	1515	1674	1461	1061
INTEREST DURING CONSTRUCTION	2207	2385	2216	2521	2798	2431	1776
LAND	78	87	77	55	55	55	132
WORKING CAPITAL	65	67	49	77	193	55	42
TOTAL CAPITAL INVESTMENT	16908	18272	16963	19315	21534	19218	14138

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.104 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-3

PLANT SIZE: 100 MW

COAL: 0.35 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	146	---	139	---	---	---	161
-LIMESTONE	---	173	---	86	---	---	---
-SODA ASH	---	---	12	---	1169	50	---
-MAGNESIUM OXIDE	---	---	---	10	---	---	---
-COAL	---	---	---	---	---	30	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	373	397	185	367	364	517	341
-WATER	6	6	7	22	114	63	2
-STEAM	256	232	256	263	826	---	---
-FUEL OIL	---	---	---	205	---	82	---
-NATURAL GAS	---	---	---	---	-45	---	---
-HEAT CREDIT	---	---	---	(9)	(-1)	(22)	---
TOTAL VARIABLE O&M COST	781	808	599	944	2429	720	504
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	111	111	159	210	207	225	111
MAINTENANCE							
-LABOR & MATERIAL	814	879	496	858	947	822	533
TOTAL FIXED O&M COST	924	989	655	1067	1155	1047	645
OVERHEAD							
-PLANT	462	495	328	534	577	524	322
-ADMINISTRATIVE	11	11	16	21	21	23	11
-MARKETING	---	---	---	13	-8	10	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(131)	---	---	---
-SULFUR	---	---	---	---	(-79)	(96)	---
NET OPERATING COST	2178	2304	1598	2448	4253	2227	1483
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.34	4.69	4.36	4.96	5.53	4.94	3.63
-LEVELIZED OPERATING COST (MILL/KWH)	5.86	6.20	4.30	6.59	11.44	5.99	3.99
TOTAL LEVELIZED COST (MILL/KWH)	10.21	10.89	8.66	11.55	16.98	10.93	7.62

TABLE 0-1.105 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-4

PLANT SIZE: 500 MW

COAL: 1.00 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1345	2072	1264	553	528	608	1474
GAS HANDLING	6862	6865	6732	7335	7449	7963	7964
CHLORIDE PURGE	---	---	---	6446	3362	---	---
SO2 ABSORPTION	13419	14152	14652	8664	13272	15167	21825
STACK GAS REHEAT	2040	2025	2025	1901	1873	---	---
REGENERATION	---	---	203	5193	5832	5648	---
SLUDGE DISPOSAL	1243	1299	2098	---	---	---	485
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3599	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4547	1828	---
ESP CREDIT	---	---	---	---	---	---	(10935)
SERVICES, UTILITIES, MISC	1495	1585	1618	2021	2212	1873	1249
SLUDGE POND	1737	1962	1642	---	356	---	297
TOTAL DIRECT INVESTMENT	28140	29959	30234	35712	39430	33086	22360
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2533	2696	2721	3214	3549	2978	2012
CONSTRUCTION EXPENSE	4502	4793	4837	5714	6309	5294	3578
CONTRACTOR FEES	1407	1498	1512	1786	1972	1654	1118
CONTINGENCY	7316	7789	7861	9285	10252	10753	7474
ALLOWANCE FOR SHAKEDOWN	4216	4477	4552	5571	6115	5161	3458
INTEREST DURING CONSTRUCTION	7305	7777	7848	9270	10235	8589	5804
LAND	176	212	176	22	22	22	415
WORKING CAPITAL	346	343	294	429	583	303	262
TOTAL CAPITAL INVESTMENT	55942	59546	60035	71003	78467	67840	46481

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.106 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-4

PLANT SIZE: 500 MW

COAL: 1.00 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1474	---	1403	---	---	---	1623
-LIMESTONE	---	1251	---	424	---	---	---
-SODA ASH	---	---	135	---	1453	552	---
-MAGNESIUM OXIDE	---	---	---	95	---	---	---
-COAL	---	---	---	---	---	244	---
-CATALYST	---	---	---	1	---	2	---
UTILITIES							
-ELECTRICITY	1541	1738	852	1678	1585	2308	1523
-WATER	27	27	31	137	535	295	9
-STEAM	1142	1130	1143	1174	3684	---	---
-FUEL OIL	---	---	---	1870	---	745	---
-NATURAL GAS	---	---	---	---	291	---	---
-HEAT CREDIT	---	---	---	(90)	(12)	(211)	---
TOTAL VARIABLE O&M COST	4184	4146	3564	5290	7536	3935	3155
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	7
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	322	322	430	617	610	662	322
MAINTENANCE							
-LABOR & MATERIAL	2160	2294	1192	2494	2739	2297	1329
TOTAL FIXED O&M COST	2482	2616	1621	3111	3349	2959	1659
OVERHEAD							
-PLANT	1241	1308	811	1555	1675	1480	829
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	126	73	92	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1263)	---	---	---
-SULFUR	---	---	---	---	(735)	(924)	---
NET OPERATING COST	7939	8103	6039	8882	11959	7609	5675
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	2.87	3.06	3.08	3.65	4.03	3.48	2.39
-LEVELIZED OPERATING COST (MILL/KWH)	4.27	4.36	3.25	4.78	6.44	4.10	3.05
TOTAL LEVELIZED COST (MILL/KWH)	7.15	7.42	6.33	8.43	10.47	7.58	5.44

TABLE G-1.107 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW

REGION: WSCC-4

PLANT SIZE: 500 MW

COAL: 0.55 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	891	1505	827	382	345	398	984
GAS HANDLING	6882	6885	6751	7356	7471	7986	7987
CHLORINE PURGE	---	---	---	6465	3371	---	---
SO2 ABSORPTION	13456	14191	14695	8690	13311	15212	21885
STACK GAS REHEAT	2046	2031	2031	1907	1878	---	---
REGENERATION	---	---	142	3692	4148	4017	---
SLUDGE DISPOSAL	1019	1066	1489	---	---	---	339
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2387	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2992	1203	---
ESP CREDIT	---	---	---	---	---	---	(10962)
SERVICES, UTILITIES, MISC	1458	1541	1556	1853	2011	1729	1214
SLUDGE POND	1119	1255	1071	---	357	---	298
TOTAL DIRECT INVESTMENT	26872	28474	28562	32729	35885	30543	21745
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2418	2563	2571	2946	3230	2749	1957
CONSTRUCTION EXPENSE	4300	4556	4570	5237	5742	4887	3479
CONTRACTOR FEES	1344	1424	1428	1636	1794	1527	1087
CONTINGENCY	6987	7403	7426	8510	9330	9927	7087
ALLOWANCE FOR SHAKEDOWN	4080	4316	4349	5106	5562	4765	3363
INTEREST DURING CONSTRUCTION	6976	7391	7414	8496	9315	7929	5645
LAND	103	123	103	22	22	22	376
WORKING CAPITAL	291	295	235	353	568	254	202
TOTAL CAPITAL INVESTMENT	53370	56544	56658	65035	71447	62602	44941

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.108 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: WSCC-4		PLANT SIZE: 500 MW		COAL: 0.55 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME		811	---	772	---	---	---	893
-LIMESTONE		---	688	---	424	---	---	---
-SODA ASH		---	---	74	---	1424	304	---
-MAGNESIUM OXIDE		---	---	---	52	---	---	---
-COAL		---	---	---	---	---	134	---
-CATALYST		---	---	---	1	---	1	---
UTILITIES								
-ELECTRICITY		1539	1727	831	1609	1582	2315	1528
-WATER		26	26	31	103	502	280	9
-STEAM		1145	1122	1146	1178	3695	---	---
-FUEL OIL		---	---	---	1028	---	410	---
-NATURAL GAS		---	---	---	---	128	---	---
-HEAT CREDIT		---	---	---	(49)	(5)	(116)	---
TOTAL VARIABLE O&M COST		3521	3562	2854	4346	7325	3328	2429
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	6
LABOR								
-OPERATING, ANALYSIS, SUPERVISION		312	312	416	598	591	641	312
MAINTENANCE								
-LABOR & MATERIAL		2090	2211	1130	2285	2491	2120	1292
TOTAL FIXED O&M COST		2402	2523	1547	2883	3082	2761	1611
OVERHEAD								
-PLANT		1201	1261	773	1442	1541	1381	805
-ADMINISTRATIVE		31	31	42	60	59	64	31
-MARKETING		---	---	---	69	32	51	---
BYPRODUCT SALES								
-SULFURIC ACID		---	---	---	(694)	---	---	---
-SULFUR		---	---	---	---	(323)	(508)	---
NET OPERATING COST		7154	7377	5216	8106	11717	7077	4876
LEVELIZED - 30 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)		2.74	2.90	2.91	3.34	3.67	3.22	2.31
-LEVELIZED OPERATING COST (MILL/KWH)		3.85	3.97	2.81	4.36	6.31	3.81	2.62
TOTAL LEVELIZED COST (MILL/KWH)		6.59	6.88	5.72	7.70	9.98	7.02	4.93

TABLE G-1.109 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW	REGION: WSCC-4	PLANT SIZE: 100 MW	COAL: 1.00 % SULFUR				
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	466	912	424	212	176	202	519
GAS HANDLING	1906	1894	1916	2087	2120	2266	2211
CHLORIDE PURGE	---	---	---	1491	778	---	---
SO2 ABSORPTION	4032	4251	4010	2377	3650	4171	6588
STACK GAS REHEAT	566	594	594	535	523	---	---
REGENERATION	---	---	80	2143	2409	2334	---
SLUDGE DISPOSAL	744	778	863	---	---	---	191
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1240	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1535	617	---
ESP CREDIT	---	---	---	---	---	---	(3162)
SERVICES, UTILITIES, MISC	463	506	473	605	671	575	381
SLUDGE POND	551	611	537	---	76	---	63
TOTAL DIRECT INVESTMENT	8727	9546	8897	10490	11938	10166	6791
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	785	859	801	962	1074	915	611
CONSTRUCTION EXPENSE	1396	1527	1424	1710	1910	1627	1086
CONTRACTOR FEES	436	477	445	534	597	508	340
CONTINGENCY	2269	2482	2313	2779	3104	3304	2270
ALLOWANCE FOR SHAKEDOWN	1306	1428	1334	1668	1855	1586	1053
INTEREST DURING CONSTRUCTION	2265	2478	2310	2775	3099	2639	1763
LAND	48	56	48	22	22	22	99
WORKING CAPITAL	76	72	62	92	209	64	56
TOTAL CAPITAL INVESTMENT	17310	18926	17634	21232	23809	20830	14067

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.110 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: NEW REGION: WSCC-4 PLANT SIZE: 100 MW COAL: 1.00 % SULFUR							
OPERATING COST	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
(VARIABLE)							
RAW MATERIAL							
-LIME	313	---	298	---	---	---	344
-LIMESTONE	---	265	---	90	---	---	---
-SODA ASH	---	---	29	---	1378	117	---
-MAGNESIUM OXIDE	---	---	---	20	---	---	---
-COAL	---	---	---	---	---	52	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	356	380	181	366	347	489	323
-WATER	6	6	7	30	117	63	2
-STEAM	242	222	242	249	781	---	---
-FUEL OIL	---	---	---	397	---	158	---
-NATURAL GAS	---	---	---	---	7	---	---
-HEAT CREDIT	---	---	-1	(19)	(0)	(45)	---
TOTAL VARIABLE O&M COST	916	873	756	1133	2629	835	669
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	2
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	121	121	173	229	227	247	121
MAINTENANCE							
-LABOR & MATERIAL	820	896	511	944	1050	893	529
TOTAL FIXED O&M COST	941	1018	684	1173	1277	1139	652
OVERHEAD							
-PLANT	471	509	342	587	638	570	326
-ADMINISTRATIVE	12	12	17	23	23	25	12
-MARKETING	---	---	---	27	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(268)	---	---	---
-SULFUR	---	---	---	---	(17)	(196)	---
NET OPERATING COST	2340	2412	1799	2675	4552	2392	1659
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.45	4.86	4.53	5.45	6.12	5.35	3.61
-LEVELIZED OPERATING COST (MILL/KWH)	6.30	6.49	4.84	7.20	12.25	6.44	4.47
TOTAL LEVELIZED COST (MILL/KWH)	10.74	11.35	9.37	12.65	18.37	11.79	8.08

TABLE G-1.111 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: NEW		REGION: WSCC-4		PLANT SIZE: 100 MW		COAL: 0.55 % SULFUR	
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	311	869	279	146	115	132	349
GAS HANDLING	1911	1900	1922	2093	2126	2273	2217
CHLORIDE PURGE	---	---	---	1495	780	---	---
SO2 ABSORPTION	4043	4263	4022	2384	3661	4184	4606
STACK GAS REHEAT	568	596	596	536	525	---	---
REGENERATION	---	---	56	1524	1714	1660	---
SLUDGE DISPOSAL	610	638	612	---	---	---	134
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	822	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1010	406	---
ESP CREDIT	---	---	---	---	---	---	(3170)
SERVICES, UTILITIES, MISC	447	484	449	540	596	519	368
SLUDGE POND	352	387	347	---	76	---	63
TOTAL DIRECT INVESTMENT	8242	8938	8284	9541	10602	9173	6567
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	742	804	746	859	954	826	591
CONSTRUCTION EXPENSE	1319	1430	1325	1527	1696	1468	1051
CONTRACTOR FEES	412	447	414	477	530	459	328
CONTINGENCY	2143	2324	2154	2481	2757	2981	2140
ALLOWANCE FOR SHAKEDOWN	1251	1356	1258	1488	1646	1431	1018
INTEREST DURING CONSTRUCTION	2140	2320	2150	2477	2752	2381	1705
LAND	33	37	32	22	22	22	90
WORKING CAPITAL	64	62	50	76	204	54	43
TOTAL CAPITAL INVESTMENT	16344	17717	16413	18946	21164	18795	13533

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.112 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/B1

APPLICATION: NEW

REGION: WSCC-4

PLANT SIZE: 100 MW

COAL: 0.55 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	172	---	164	---	---	---	189
-LIMESTONE	---	146	---	90	---	---	---
-SODA ASH	---	---	16	---	1351	64	---
-MAGNESIUM OXIDE	---	---	---	11	---	---	---
-COAL	---	---	---	---	---	29	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	355	378	176	351	346	491	324
-WATER	3	5	6	22	110	59	2
-STEAM	243	220	243	250	784	---	---
-FUEL OIL	---	---	---	218	---	87	---
-NATURAL GAS	---	---	---	---	-27	---	---
-HEAT CREDIT	---	---	---	(10)	(-1)	(25)	---
TOTAL VARIABLE O&M COST	776	749	605	933	2564	706	515
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	1
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	111	111	159	210	207	225	111
MAINTENANCE							
-LABOR & MATERIAL	786	852	480	843	932	805	512
TOTAL FIXED O&M COST	897	963	639	1052	1139	1031	624
OVERHEAD							
-PLANT	448	481	320	526	570	515	312
-ADMINISTRATIVE	11	11	16	21	21	23	11
-MARKETING	---	---	---	15	-7	11	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(147)	---	---	---
-SULFUR	---	---	---	---	(-68)	(108)	---
NET OPERATING COST	2132	2204	1580	2400	4355	2177	1462
LEVELIZED - 30 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.20	4.55	4.22	4.87	5.44	4.83	3.48
-LEVELIZED OPERATING COST (MILL/KWH)	5.74	5.93	4.25	6.46	11.72	5.86	3.94
TOTAL LEVELIZED COST (MILL/KWH)	9.93	10.48	8.47	11.32	17.16	10.69	7.41

TABLE G-1.113 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: ECAR

PLANT SIZE: 500 MW

COAL: 3.65 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3976	4906	3846	1472	1607	1850	4280
GAS HANDLING	8233	8235	8079	8803	8940	9557	9554
CHLORIDE PURGE	---	---	---	6304	3288	---	---
SO2 ABSORPTION	14717	15521	16046	9489	14536	14611	23937
STACK GAS REHEAT	2128	2115	2115	1984	1954	---	---
REGENERATION	---	---	497	12262	13760	13326	---
SLUDGE DISPOSAL	2187	2284	5208	---	---	---	1250
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9647	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	12411	4989	---
ESP CREDIT	---	---	---	---	---	---	(10731)
SERVICES, UTILITIES, MISC	1874	1984	2147	2998	3390	2780	1697
SLUDGE POND	4842	5570	4426	---	348	---	290
TOTAL DIRECT INVESTMENT	37956	40614	42364	52958	60234	49114	30279
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3416	3655	3813	4766	5421	4420	2725
CONSTRUCTION EXPENSE	6073	6498	6778	8473	9637	7858	4845
CONTRACTOR FEES	1898	2031	2118	2648	3012	2456	1514
CONTINGENCY	9869	10560	11015	13769	15661	15962	11612
ALLOWANCE FOR SHAKEDOWN	5437	5779	6166	8261	9362	7662	4695
INTEREST DURING CONSTRUCTION	9853	10543	10997	13747	15636	12749	7860
LAND	1382	1677	1376	64	64	64	1196
WORKING CAPITAL	715	448	681	919	574	680	666
TOTAL CAPITAL INVESTMENT	76599	81804	85308	105606	119601	100964	65391

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.114 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: ECAR

PLANT SIZE: 500 MW

COAL: 3.65 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	5915	---	5633	---	---	---	6513
-LIMESTONE	---	2372	---	412	---	---	---
-SODA ASH	---	---	429	---	1172	1756	---
-MAGNESIUM OXIDE	---	---	---	461	---	---	---
-COAL	---	---	---	---	---	2124	---
-CATALYST	---	---	---	6	---	21	---
UTILITIES							
-ELECTRICITY	1555	1813	995	2155	1604	2254	1488
-WATER	33	35	34	375	766	377	12
-STEAM	1115	1187	1116	1147	3598	---	---
-FUEL OIL	---	---	---	7223	---	2877	---
-NATURAL GAS	---	---	---	---	580	---	---
-HEAT CREDIT	---	---	---	(372)	(60)	(875)	---
TOTAL VARIABLE O&M COST	8619	5408	8207	11406	7660	8535	8013
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	520
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	383	383	509	733	725	788	383
MAINTENANCE							
-LABOR & MATERIAL	2789	2965	1648	3698	4192	3409	1803
TOTAL FIXED O&M COST	3173	3349	2158	4431	4916	4198	2707
OVERHEAD							
-PLANT	1586	1674	1079	2215	2458	2099	1354
-ADMINISTRATIVE	38	38	51	73	72	79	38
-MARKETING	---	---	---	523	362	382	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5226)	---	---	---
-SULFUR	---	---	---	---	(3624)	(3823)	---
NET OPERATING COST	13416	10469	11494	13422	11845	11470	12112
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.15	4.44	4.63	5.73	6.49	5.47	3.55
-LEVELIZED OPERATING COST (MILL/KWH)	6.24	4.87	5.34	6.24	5.51	5.33	5.63
TOTAL LEVELIZED COST (MILL/KWH)	10.39	9.30	9.97	11.97	11.99	10.81	9.18

TABLE G-1.115 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT REGION: ECAR PLANT SIZE: 500 MW COAL: 1.20 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1540	2329	1446	630	612	705	1688
GAS HANDLING	8520	8523	8355	9104	9246	9884	9887
CHLORIDE PURGE	---	---	---	6524	3402	---	---
SO2 ABSORPTION	15201	16032	16611	9822	15046	17194	24723
STACK GAS REHEAT	2202	2186	2186	2052	2021	---	---
REGENERATION	---	---	221	5646	6340	6141	---
SLUDGE DISPOSAL	1395	1458	2390	---	---	---	553
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3791	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4793	1927	---
ESP CREDIT	---	---	---	---	---	---	(11047)
SERVICES, UTILITIES, MISC	1731	1832	1872	2254	2488	2151	1548
SLUDGE POND	1817	2053	1715	---	361	---	301
TOTAL DIRECT INVESTMENT	32406	34411	34795	39823	44309	38000	27654
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2917	3097	3132	3584	3988	3420	2489
CONSTRUCTION EXPENSE	5185	5506	5567	6372	7090	6080	4425
CONTRACTOR FEES	1620	1721	1740	1991	2215	1900	1383
CONTINGENCY	8426	8947	9047	10354	11520	12350	9347
ALLOWANCE FOR SHAKEDOWN	4874	5163	5257	6212	6876	5928	4284
INTEREST DURING CONSTRUCTION	8412	8932	9032	10337	11502	9864	7179
LAND	385	461	383	64	64	64	618
WORKING CAPITAL	353	293	298	432	547	321	268
TOTAL CAPITAL INVESTMENT	64577	68530	69251	79170	88113	77928	57646

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.116 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: ECAR		PLANT SIZE: 500 MW		COAL: 1.20 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESTA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	1519	---	---	1447	---	---	---	1673
-LIMESTONE	---	---	609	---	412	---	---	---
-SODA ASH	---	---	---	110	---	1119	451	---
-MAGNESIUM OXIDE	---	---	---	---	118	---	---	---
-COAL	---	---	---	---	---	---	545	---
-CATALYST	---	---	---	---	2	---	5	---
UTILITIES								
-ELECTRICITY	1561	1762	---	865	1707	1606	2337	1543
-WATER	27	27	---	31	143	546	306	9
-STEAM	1156	1146	---	1157	1189	3731	---	---
-FUEL OIL	---	---	---	---	1855	---	739	---
-NATURAL GAS	---	---	---	---	---	127	---	---
-HEAT CREDIT	---	---	---	---	(96)	(13)	(225)	---
TOTAL VARIABLE O&M COST		4263	3545	3611	5330	7115	4159	3225
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	260
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	327	327	---	436	626	619	672	327
MAINTENANCE								
-LABOR & MATERIAL	2497	2645	---	1373	2781	3079	2638	1646
TOTAL FIXED O&M COST		2824	2972	1809	3407	3698	3310	2233
OVERHEAD								
-PLANT	1412	1486	---	904	1703	1849	1655	1117
-ADMINISTRATIVE	33	33	---	44	63	62	67	33
-MARKETING	---	---	---	---	134	79	98	---
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	---	(1342)	---	---	---
-SULFUR	---	---	---	---	---	(792)	(982)	---
NET OPERATING COST		8532	8036	6368	9295	12012	8308	6607
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	3.50	3.72	---	3.76	4.29	4.78	4.23	3.13
-LEVELIZED OPERATING COST (MILL/KWH)	3.97	3.74	---	2.96	4.32	5.58	3.86	3.07
TOTAL LEVELIZED COST (MILL/KWH)		7.47	7.45	6.72	8.61	10.36	8.09	6.20

TABLE G-1.117 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT	REGION: ECAR	PLANT SIZE: 100 MW	COAL: 3.65 % SULFUR				
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1351	2102	1263	560	535	616	1484
GAS HANDLING	2147	2133	2159	2352	2389	2553	2490
CHLORIDE PURGE	---	---	---	1460	762	---	---
SO2 ABSORPTION	4151	4377	4124	2444	3754	4290	6784
STACK GAS REHEAT	554	582	582	524	512	---	---
REGENERATION	---	---	197	5066	5690	5511	---
SLUDGE DISPOSAL	1310	1369	2143	---	---	---	494
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3327	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4196	1687	---
ESP CREDIT	---	---	---	---	---	---	(3107)
SERVICES, UTILITIES, MISC	571	634	628	944	1070	879	489
SLUDGE POND	1581	1782	1498	---	74	---	62
TOTAL DIRECT INVESTMENT	11665	12981	12595	16678	18983	15536	8695
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1050	1168	1134	1501	1708	1398	783
CONSTRUCTION EXPENSE	1866	2077	2015	2668	3037	2486	1391
CONTRACTOR FEES	583	649	630	834	949	777	435
CONTINGENCY	3033	3375	3275	4336	4936	5049	3334
ALLOWANCE FOR SHAKEDOWN	1662	1847	1815	2602	2954	2424	1350
INTEREST DURING CONSTRUCTION	3028	3370	3270	4329	4928	4033	2257
LAND	325	388	324	64	64	64	286
WORKING CAPITAL	154	95	145	196	193	144	142
TOTAL CAPITAL INVESTMENT	23367	25949	25202	33209	37752	31912	18672

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.118 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: ECAR

PLANT SIZE: 100 MW

COAL: 3.65 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LINE	1257	---	1197	---	---	---	1384
-LIMESTONE	---	504	---	88	---	---	---
-SODA ASH	---	---	91	---	1112	373	---
-MAGNESIUM OXIDE	---	---	---	98	---	---	---
-COAL	---	---	---	---	---	451	---
-CATALYST	---	---	---	1	---	5	---
UTILITIES							
-ELECTRICITY	359	396	211	468	351	479	316
-WATER	7	8	7	80	166	80	2
-STEAM	237	235	237	244	764	---	---
-FUEL OIL	---	---	---	1534	---	611	---
-NATURAL GAS	---	---	---	---	100	---	---
-HEAT CREDIT	---	---	---	(79)	(10)	(186)	---
TOTAL VARIABLE O&M COST	1859	1143	1743	2434	2483	1813	1702
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	111
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	182	182	252	345	341	373	182
MAINTENANCE							
-LABOR & MATERIAL	1038	1154	702	1473	1672	1364	679
TOTAL FIXED O&M COST	1221	1336	954	1818	2013	1737	972
OVERHEAD							
-PLANT	610	668	477	909	1007	868	486
-ADMINISTRATIVE	18	18	25	34	34	37	18
-MARKETING	---	---	---	111	62	81	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1110)	---	---	---
-SULFUR	---	---	---	---	(624)	(812)	---
NET OPERATING COST	3709	3166	3200	4196	4975	3725	3178
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	6.34	7.64	6.83	9.00	10.24	8.65	5.06
-LEVELIZED OPERATING COST (MILL/KWH)	8.62	7.36	7.44	9.75	11.57	8.66	7.39
TOTAL LEVELIZED COST (MILL/KWH)	14.96	14.39	14.27	18.76	21.80	17.31	12.45

TABLE G-1.119 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT		REGION: ECAR		PLANT SIZE: 100 MW		COAL: 1.20 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	532	1022	483	241	204	235	594
GAS HANDLING	2222	2208	2233	2432	2471	2641	2577
CHLORIDE PURGE	---	---	---	1511	788	---	---
SO2 ABSORPTION	4288	4522	4269	2530	3885	4440	7006
STACK GAS REHEAT	574	602	602	542	530	---	---
REGENERATION	---	---	88	2333	2622	2539	---
SLUDGE DISPOSAL	835	873	984	---	---	---	218
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1308	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1620	651	---
ESP CREDIT	---	---	---	---	---	---	(3199)
SERVICES, UTILITIES, MISC	507	554	520	654	727	630	432
SLUDGE POND	578	641	562	---	77	---	64
TOTAL DIRECT INVESTMENT	9536	10421	9740	11551	12925	11137	7692
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	858	938	877	1040	1163	1002	692
CONSTRUCTION EXPENSE	1526	1667	1558	1848	2068	1782	1231
CONTRACTOR FEES	477	521	487	578	646	557	385
CONTINGENCY	2479	2709	2532	3003	3360	3619	2600
ALLOWANCE FOR SHAKEDOWN	1430	1562	1463	1802	2009	1737	1194
INTEREST DURING CONSTRUCTION	2475	2705	2528	2998	3355	2891	1997
LAND	114	130	113	64	64	64	163
WORKING CAPITAL	77	62	63	93	184	68	57
TOTAL CAPITAL INVESTMENT	18972	20715	19363	22976	25774	22858	16010

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.120 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: ECAR

PLANT SIZE: 100 MW

COAL: 1.20 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	323	---	307	---	---	---	355
-LIMESTONE	---	129	---	88	---	---	---
-SODA ASH	---	---	23	---	1062	90	---
-MAGNESIUM OXIDE	---	---	---	25	---	---	---
-COAL	---	---	---	---	---	116	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	361	386	184	373	352	497	328
-WATER	6	6	7	31	119	65	2
-STEAM	246	226	246	253	793	---	---
-FUEL OIL	---	---	---	394	---	157	---
-NATURAL GAS	---	---	---	---	5	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(48)	---
TOTAL VARIABLE O&M COST	935	747	767	1143	2330	884	685
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	55
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	126	126	179	238	235	256	126
MAINTENANCE							
-LABOR & MATERIAL	898	980	560	1020	1137	978	600
TOTAL FIXED O&M COST	1023	1106	739	1258	1372	1234	781
OVERHEAD							
-PLANT	512	553	369	629	686	617	391
-ADMINISTRATIVE	13	13	18	24	24	26	13
-MARKETING	---	---	---	29	3	21	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(285)	---	---	---
-SULFUR	---	---	---	---	(29)	(209)	---
NET OPERATING COST	2483	2419	1893	2797	4386	2572	1869
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.14	5.62	5.25	6.23	6.99	6.20	4.34
-LEVELIZED OPERATING COST (MILL/KWH)	5.77	5.62	4.40	6.50	10.19	5.98	4.35
TOTAL LEVELIZED COST (MILL/KWH)	10.91	11.24	9.65	12.73	17.18	12.18	8.69

APPLICATION: RETROFIT

REGION: ERCOT

PLANT SIZE: 500 MW

COAL: 1.00 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	862	1483	794	373	336	387	954
GAS HANDLING	11642	11662	11358	12376	12570	13436	13512
CHLORIDE PURGE	---	---	---	8916	4650	---	---
SO2 ABSORPTION	20427	21543	22769	13457	20603	23544	33188
STACK GAS REHEAT	3010	2952	2952	2797	2759	---	---
REGENERATION	---	---	133	3490	3922	3798	---
SLUDGE DISPOSAL	1055	1103	1474	---	---	---	334
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2124	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2657	1068	---
ESP CREDIT	---	---	---	---	---	---	(14394)
SERVICES, UTILITIES, MISC	2220	2325	2369	2612	2850	2534	2016
SLUDGE POND	977	1093	938	---	502	---	418
TOTAL DIRECT INVESTMENT	40192	42160	42787	46146	50847	44767	36028
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3617	3794	3851	4153	4576	4029	3243
CONSTRUCTION EXPENSE	6431	6746	6846	7383	8136	7163	5765
CONTRACTOR FEES	2010	2108	2139	2307	2542	2238	1801
CONTINGENCY	10450	10962	11125	11998	13220	14549	12044
ALLOWANCE FOR SHAKEDOWN	6172	6468	6581	7199	7882	6984	5579
INTEREST DURING CONSTRUCTION	10433	10944	11107	11979	13199	11621	9352
LAND	40	47	40	14	14	14	158
WORKING CAPITAL	366	367	287	426	714	319	240
TOTAL CAPITAL INVESTMENT	79711	83596	84763	91604	101131	91683	74208

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.122 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: ERCOT

PLANT SIZE: 500 MW

COAL: 1.00 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	664	---	632	---	---	---	731
-LIMESTONE	---	405	---	418	---	---	---
-SODA ASH	---	---	48	---	1096	196	---
-MAGNESIUM OXIDE	---	---	---	47	---	---	---
-COAL	---	---	---	---	---	138	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	2119	2400	1152	2196	2203	3254	2148
-WATER	35	35	43	121	677	416	13
-STEAM	1610	1595	1611	1656	5194	---	---
-FUEL OIL	---	---	---	837	---	333	---
-NATURAL GAS	---	---	---	---	86	---	---
-HEAT CREDIT	---	---	---	(41)	(4)	(97)	---
TOTAL VARIABLE O&M COST	4428	4435	3486	5233	9252	4241	2892
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	314
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	322	322	430	617	610	662	322
MAINTENANCE							
-LABOR & MATERIAL	3160	3312	1700	3222	3530	3108	2144
TOTAL FIXED O&M COST	3483	3634	2130	3839	4140	3770	2780
OVERHEAD							
-PLANT	1741	1817	1065	1920	2070	1885	1390
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	58	24	42	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(578)	---	---	---
-SULFUR	---	---	---	---	(239)	(423)	---
NET OPERATING COST	9684	9918	6724	10534	15309	9582	7094
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.32	4.53	4.60	4.97	5.48	4.97	4.02
-LEVELIZED OPERATING COST (MILL/KWH)	4.50	4.61	3.13	4.90	7.12	4.45	3.30
TOTAL LEVELIZED COST (MILL/KWH)	8.82	9.14	7.72	9.86	12.60	9.43	7.32

TABLE D-1.123 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: ERCOT PLANT SIZE: 500 MW COAL: 0.75 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1541	2330	1447	631	613	705	1689
GAS HANDLING	10887	10903	10633	11586	11767	12579	12635
CHLORIDE PURGE	---	---	---	8337	4348	---	---
SO2 ABSORPTION	19170	20219	21278	12577	19258	22007	31154
STACK GAS REHEAT	2814	2767	2767	2617	2581	---	---
REGENERATION	---	---	221	5648	6344	6144	---
SLUDGE DISPOSAL	1395	1458	2391	---	---	---	553
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3793	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4796	1928	---
ESP CREDIT	---	---	---	---	---	---	(13598)
SERVICES, UTILITIES, MISC	2148	2261	2324	2711	2982	2602	1946
SLUDGE POND	1818	2054	1716	---	468	---	390
TOTAL DIRECT INVESTMENT	39774	41991	42776	47901	53155	45963	34770
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3580	3779	3850	4311	4784	4137	3129
CONSTRUCTION EXPENSE	6364	6719	6844	7664	8505	7354	5563
CONTRACTOR FEES	1989	2100	2139	2395	2658	2298	1738
CONTINGENCY	10341	10918	11122	12454	13820	14938	11462
ALLOWANCE FOR SHAKEDOWN	6023	6345	6502	7473	8245	7170	5385
INTEREST DURING CONSTRUCTION	10325	10900	11104	12434	13798	11931	9026
LAND	82	98	82	14	14	14	167
WORKING CAPITAL	419	392	349	506	692	363	308
TOTAL CAPITAL INVESTMENT	78897	83241	84767	95152	105671	94169	71548

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.124 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT		REGION: ERCOT		PLANT SIZE: 500 MW		COAL: 0.75 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	1544	---	1471	---	---	---	---	1700
-LIMESTONE	---	942	---	418	---	---	---	---
-SODA ASH	---	---	111	---	1128	455	---	---
-MAGNESIUM OXIDE	---	---	---	110	---	---	---	---
-COAL	---	---	---	---	---	321	---	---
-CATALYST	---	---	---	2	---	3	---	---
UTILITIES								
-ELECTRICITY	1991	2262	1106	2152	2066	3031	2000	
-WATER	34	35	40	161	680	376	12	
-STEAM	1499	1497	1501	1542	4838	---	---	
-FUEL OIL	---	---	---	1945	---	775	---	
-NATURAL GAS	---	---	---	---	285	---	---	
-HEAT CREDIT	---	---	---	(96)	(13)	(225)	---	
TOTAL VARIABLE O&M COST		5069	4736	4229	6234	8984	4736	3712
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	335
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	316	316	422	607	599	650	316	
MAINTENANCE								
-LABOR & MATERIAL	3085	3250	1692	3345	3693	3191	2069	
TOTAL FIXED O&M COST		3402	3567	2114	3951	4292	3841	2721
OVERHEAD								
-PLANT	1701	1783	1057	1976	2146	1921	1360	
-ADMINISTRATIVE	32	32	42	61	60	65	32	
-MARKETING	---	---	---	134	79	98	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1343)	---	---	---	
-SULFUR	---	---	---	---	(793)	(983)	---	
NET OPERATING COST		10203	10118	7442	11012	14769	9678	7825
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	4.28	4.51	4.60	5.16	5.73	5.11	3.88	
-LEVELIZED OPERATING COST (MILL/KWH)	4.74	4.70	3.46	5.12	6.87	4.50	3.64	
TOTAL LEVELIZED COST (MILL/KWH)		9.02	9.22	8.06	10.28	12.60	9.61	7.52

APPLICATION: RETROFIT

REGION: ERCOT

PLANT SIZE: 100 MW

COAL: 1.00 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	301	660	269	143	112	129	339
GAS HANDLING	3036	3021	3036	3306	3358	3590	3522
CHLORIDE PURGE	---	---	---	2065	1077	---	---
SO2 ABSORPTION	5762	6076	5852	3467	5320	6080	9405
STACK GAS REHEAT	784	813	813	739	724	---	---
REGENERATION	---	---	53	1442	1622	1571	---
SLUDGE DISPOSAL	632	661	607	---	---	---	132
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	733	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	898	361	---
ESP CREDIT	---	---	---	---	---	---	(4168)
SERVICES, UTILITIES, MISC	631	674	638	714	787	704	554
SLUDGE POND	307	337	303	---	107	---	89
TOTAL DIRECT INVESTMENT	11453	12242	11569	12608	14005	12434	9872
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1031	1102	1041	1135	1260	1119	888
CONSTRUCTION EXPENSE	1832	1959	1851	2017	2241	1990	1579
CONTRACTOR FEES	573	612	578	630	700	622	494
CONTINGENCY	2978	3183	3008	3278	3641	4041	3300
ALLOWANCE FOR SHAKEDOWN	1756	1876	1775	1967	2174	1940	1531
INTEREST DURING CONSTRUCTION	2973	3178	3003	3273	3636	3228	2563
LAND	15	17	15	14	14	14	40
WORKING CAPITAL	81	77	61	92	216	68	51
TOTAL CAPITAL INVESTMENT	22692	24246	22902	25014	27888	25455	20318

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.126 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: ERCOT		PLANT SIZE: 100 MW		COAL: 1.00 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	141	---	134	---	---	---	---	155
-LIMESTONE	---	86	---	89	---	---	---	---
-SODA ASH	---	---	10	---	1040	42	---	---
-MAGNESIUM OXIDE	---	---	---	10	---	---	---	---
-COAL	---	---	---	---	---	29	---	---
-CATALYST	---	---	---	0	---	0	---	---
UTILITIES								
-ELECTRICITY	490	526	245	481	483	691	456	
-WATER	8	8	9	26	148	88	3	
-STEAM	342	314	342	352	1103	---	---	
-FUEL OIL	---	---	---	178	---	71	---	
-NATURAL GAS	---	---	---	---	-31	---	---	
-HEAT CREDIT	---	---	---	(9)	(-1)	(21)	---	
TOTAL VARIABLE O&M COST		981	933	741	1127	2746	901	614
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	67
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	121	121	173	229	227	247	121	
MAINTENANCE								
-LABOR & MATERIAL	1105	1180	676	1114	1231	1092	770	
TOTAL FIXED O&M COST		1226	1301	849	1343	1457	1338	958
OVERHEAD								
-PLANT	613	651	424	671	729	669	479	
-ADMINISTRATIVE	12	12	17	23	23	25	12	
-MARKETING	---	---	---	12	-8	9	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(123)	---	---	---	
-SULFUR	---	---	---	---	(-85)	(90)	---	
NET OPERATING COST		2831	2897	2031	3053	5031	2852	2063
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	6.15	6.57	6.21	6.78	7.56	6.90	5.51	
-LEVELIZED OPERATING COST (MILL/KWH)	6.58	6.73	4.72	7.10	11.69	6.63	4.80	
TOTAL LEVELIZED COST (MILL/KWH)		12.73	13.31	10.93	13.88	19.25	13.53	10.30

TABLE B-1.127 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS.

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: ERCOT

PLANT SIZE: 100 MW

COAL: 0.75 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	533	1022	484	241	204	235	594
GAS HANDLING	2839	2825	2842	3095	3144	3361	3293
CHLORIDE PURGE	---	---	---	1931	1007	---	---
SO2 ABSORPTION	5408	5702	5468	3240	4973	5683	8829
STACK GAS REHEAT	733	762	762	691	677	---	---
REGENERATION	---	---	88	2334	2623	2541	---
SLUDGE DISPOSAL	835	874	984	---	---	---	218
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1308	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1621	652	---
ESP CREDIT	---	---	---	---	---	---	(3938)
SERVICES, UTILITIES, MISC	621	671	638	770	855	748	540
SLUDGE POND	578	641	562	---	99	---	83
TOTAL DIRECT INVESTMENT	11547	12497	11828	13611	15204	13219	9619
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1039	1125	1064	1225	1368	1190	866
CONSTRUCTION EXPENSE	1848	2000	1892	2178	2433	2115	1539
CONTRACTOR FEES	577	625	591	681	760	661	481
CONTINGENCY	3002	3249	3075	3539	3953	4296	3171
ALLOWANCE FOR SHAKEDOWN	1744	1885	1789	2123	2362	2062	1492
INTEREST DURING CONSTRUCTION	2997	3244	3070	3533	3947	3432	2497
LAND	24	28	24	14	14	14	42
WORKING CAPITAL	92	82	74	109	213	77	65
TOTAL CAPITAL INVESTMENT	22871	24736	23409	27012	30255	27066	19773

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.128 ANNUAL REVENUE REQUIREMENTS IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: ERCOT

PLANT SIZE: 100 MW

COAL: 0.75 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	328	---	312	---	---	---	361
-LIMESTONE	---	200	---	89	---	---	---
-SODA ASH	---	---	24	---	1070	97	---
-MAGNESIUM OXIDE	---	---	---	23	---	---	---
-COAL	---	---	---	---	---	68	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	460	495	235	470	453	644	425
-WATER	7	7	9	35	149	80	2
-STEAM	319	295	319	328	1028	---	---
-FUEL OIL	---	---	---	413	---	165	---
-NATURAL GAS	---	---	---	---	10	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(48)	---
TOTAL VARIABLE O&M COST	1114	998	898	1338	2710	1006	789
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	71
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	115	115	165	218	216	235	115
MAINTENANCE							
-LABOR & MATERIAL	1095	1184	683	1202	1337	1161	750
TOTAL FIXED O&M COST	1211	1300	849	1421	1553	1395	937
OVERHEAD							
-PLANT	605	650	424	710	776	698	468
-ADMINISTRATIVE	12	12	17	22	22	23	12
-MARKETING	---	---	---	29	3	21	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(285)	---	---	---
-SULFUR	---	---	---	---	(29)	(209)	---
NET OPERATING COST	2942	2959	2188	3234	5034	2935	2206
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	6.20	6.71	6.35	7.32	8.20	7.34	5.36
-LEVELIZED OPERATING COST (MILL/KWH)	6.84	6.88	5.09	7.52	11.70	6.82	3.13
TOTAL LEVELIZED COST (MILL/KWH)	13.04	13.58	11.43	14.84	19.91	14.16	10.49

TABLE 0-1.129 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: MAAC

PLANT SIZE: 500 MW

COAL: 1.90 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	862	1483	794	373	336	387	954
GAS HANDLING	7880	7880	7739	8432	8564	9154	9145
CHLORIDE PURGE	---	---	---	6034	3147	---	---
SO2 ABSORPTION	14120	14891	15352	9079	13910	15895	22970
STACK GAS REHEAT	2037	2028	2028	1900	1870	---	---
REGENERATION	---	---	133	3490	3922	3798	---
SLUDGE DISPOSAL	1055	1103	1474	---	---	---	334
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2124	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2657	1068	---
ESP CREDIT	---	---	---	---	---	---	(10340)
SERVICES, UTILITIES, MJSC	1557	1643	1651	1886	2064	1818	1384
SLUDGE POND	977	1093	938	---	332	---	277
TOTAL DIRECT INVESTMENT	28488	30120	30110	33318	36802	32121	24723
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2564	2711	2710	2999	3312	2891	2225
CONSTRUCTION EXPENSE	4558	4819	4818	5331	5888	5139	3956
CONTRACTOR FEES	1424	1506	1505	1666	1840	1606	1236
CONTINGENCY	7407	7831	7829	8663	9568	10439	8678
ALLOWANCE FOR SHAKEDOWN	4346	4590	4603	5198	5708	5011	3829
INTEREST DURING CONSTRUCTION	7395	7819	7816	8649	9553	8338	6418
LAND	251	295	250	86	86	86	753
WORKING CAPITAL	256	242	203	312	519	235	171
TOTAL CAPITAL INVESTMENT	56690	59933	59843	66221	73276	65866	51988

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.130 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: MAAC PLANT SIZE: 500 MW COAL: 1.90 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESTA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	572	---	545	---	---	---	630
-LIMESTONE	---	262	---	360	---	---	---
-SODA ASH	---	---	53	---	1211	216	---
-MAGNESIUM OXIDE	---	---	---	52	---	---	---
-COAL	---	---	---	---	---	239	---
-CATALYST	---	---	---	1	---	2	---
UTILITIES							
-ELECTRICITY	1436	1606	770	1489	1472	2152	1420
-WATER	24	24	28	92	463	304	9
-STEAM	1065	1037	1065	1095	3435	---	---
-FUEL OIL	---	---	---	789	---	314	---
-NATURAL GAS	---	---	---	---	114	---	---
-HEAT CREDIT	---	---	---	(41)	(4)	(97)	---
TOTAL VARIABLE O&M COST	3096	2929	2461	3837	6691	3131	2060
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	236
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	343	343	457	657	649	705	343
MAINTENANCE							
-LABOR & MATERIAL	2226	2351	1194	2326	2556	2230	1471
TOTAL FIXED O&M COST	2569	2693	1650	2983	3205	2935	2050
OVERHEAD							
-PLANT	1284	1347	825	1492	1603	1467	1025
-ADMINISTRATIVE	34	34	46	66	65	71	34
-MARKETING	---	---	---	58	24	42	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(578)	---	---	---
-SULFUR	---	---	---	---	(239)	(423)	---
NET OPERATING COST	6984	7004	4982	7857	11350	7223	5170
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.07	3.25	3.24	3.59	3.97	3.57	2.82
-LEVELIZED OPERATING COST (MILL/KWH)	3.25	3.26	2.32	3.65	3.28	3.36	2.40
TOTAL LEVELIZED COST (MILL/KWH)	6.32	6.51	5.56	7.24	9.25	6.93	5.22

TABLE G-1.131 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT	REGION: MAAC	PLANT SIZE: 500 MW	COAL: 1.25 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1530	2316	1435	626	608	699	1677
GAS HANDLING	7947	7947	7803	8502	8635	9230	9222
CHLORINE PURGE	---	---	---	6085	3173	---	---
SO2 ABSORPTION	14232	15010	15483	9157	14028	16030	23152
STACK GAS REHEAT	2054	2044	2044	1916	1886	---	---
REGENERATION	---	---	219	5613	6303	6105	---
SLUDGE DISPOSAL	1390	1453	2376	---	---	---	550
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3764	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4758	1913	---
ESP CREDIT	---	---	---	---	---	---	(10414)
SERVICES, UTILITIES, MISC	1629	1726	1762	2140	2363	2039	1451
SLUDGE POND	1803	2037	1702	---	335	---	279
TOTAL DIRECT INVESTMENT	30585	32533	32824	37801	42090	36016	25918
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2753	2928	2954	3402	3788	3241	2333
CONSTRUCTION EXPENSE	4894	5205	5252	6048	6734	5763	4147
CONTRACTOR FEES	1529	1627	1641	1890	2104	1801	1296
CONTINGENCY	7952	8459	8534	9828	10943	11705	8784
ALLOWANCE FOR SHAKEDOWN	4591	4871	4950	5897	6533	5618	4015
INTEREST DURING CONSTRUCTION	7939	8445	8521	9813	10926	9349	6728
LAND	508	608	506	86	86	86	892
WORKING CAPITAL	320	276	271	409	547	310	240
TOTAL CAPITAL INVESTMENT	61071	64952	65454	75174	83751	73890	54352

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.132 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: NAAC		PLANT SIZE: 500 MW		COAL: 1.25 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							

(VARIABLE)							
RAW MATERIAL							
-LIME	1316	---	1253	---	---	---	1449
-LIMESTONE	---	603	---	360	---	---	---
-SODA ASH	---	---	122	---	1246	497	---
-MAGNESIUM OXIDE	---	---	---	121	---	---	---
-COAL	---	---	---	---	---	549	---
-CATALYST	---	---	---	2	---	5	---
UTILITIES							
-ELECTRICITY	1457	1641	807	1598	1495	2171	1433
-WATER	25	26	29	138	513	286	9
-STEAM	1074	1063	1075	1105	3466	---	---
-FUEL OIL	---	---	---	1814	---	723	---
-NATURAL GAS	---	---	---	---	373	---	---
-HEAT CREDIT	---	---	---	(95)	(13)	(222)	---
TOTAL VARIABLE O&M COST	3872	3333	3286	5043	7080	4008	2891
(FIXED)							
WASTE DISPOSAL (TRUCKING)							
LABOR	---	---	---	---	---	---	283
-OPERATING, ANALYSIS, SUPERVISION	328	328	437	628	621	674	328
MAINTENANCE							
-LABOR & MATERIAL	2352	2496	1294	2639	2925	2500	1543
TOTAL FIXED O&M COST	2680	2824	1732	3268	3546	3174	2154
OVERHEAD							
-PLANT	1340	1412	866	1634	1773	1587	1077
-ADMINISTRATIVE	33	33	44	63	62	67	33
-MARKETING	---	---	---	133	78	97	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1329)	---	---	---
-SULFUR	---	---	---	---	(782)	(972)	---
NET OPERATING COST	7925	7602	5927	8811	11757	7963	6154
LEVELIZED - 20 YEARS							

-LEVELIZED CAPITAL COST (MILL/KWH)	3.31	3.52	3.55	4.08	4.54	4.01	2.95
-LEVELIZED OPERATING COST (MILL/KWH)	3.68	3.53	2.76	4.10	5.47	3.70	2.86
TOTAL LEVELIZED COST (MILL/KWH)	7.00	7.06	6.30	8.17	10.01	7.71	5.81

TABLE G-1.133 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: MAAC PLANT SIZE: 100 MW COAL: 1.90 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	301	660	269	143	112	129	339
GAS HANDLING	2055	2042	2068	2253	2288	2446	2384
CHLORIDE PURGE	---	---	---	1398	729	---	---
SO2 ABSORPTION	3983	4200	3946	2339	3592	4105	6509
STACK GAS REHEAT	531	558	558	502	491	---	---
REGENERATION	---	---	53	1442	1622	1571	---
SLUDGE DISPOSAL	632	661	607	---	---	---	132
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	733	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	898	361	---
ESP CREDIT	---	---	---	---	---	---	(2994)
SERVICES, UTILITIES, MISC	450	487	450	529	584	517	382
SLUDGE POND	307	337	303	---	71	---	59
TOTAL DIRECT INVESTMENT	8259	8945	8254	9337	10386	9128	6810
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	743	805	743	840	935	822	613
CONSTRUCTION EXPENSE	1321	1431	1321	1494	1662	1460	1090
CONTRACTOR FEES	413	447	413	467	519	456	340
CONTINGENCY	2147	2326	2146	2428	2700	2967	2390
ALLOWANCE FOR SHAKEDOWN	1258	1362	1257	1457	1613	1424	1056
INTEREST DURING CONSTRUCTION	2144	2322	2143	2424	2696	2369	1768
LAND	96	105	95	86	86	86	202
WORKING CAPITAL	57	51	43	67	180	50	36
TOTAL CAPITAL INVESTMENT	16438	17794	16414	18599	20778	18762	14306

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.134 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: MAAC		PLANT SIZE: 100 MW		COAL: 1.90 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	122	---	---	116	---	---	---	134
-LIMESTONE	---	56	---	---	77	---	---	---
-SODA ASH	---	---	---	11	---	1149	46	---
-MAGNESIUM OXIDE	---	---	---	---	11	---	---	---
-COAL	---	---	---	---	---	---	51	---
-CATALYST	---	---	---	---	0	---	1	---
UTILITIES								
-ELECTRICITY	332	352	164	326	322	457	302	
-WATER	5	5	6	20	102	65	2	
-STEAM	226	204	226	233	730	---	---	
-FUEL OIL	---	---	---	168	---	67	---	
-NATURAL GAS	---	---	---	---	-40	---	---	
-HEAT CREDIT	---	---	---	(9)	(-1)	(21)	---	
TOTAL VARIABLE O&M COST		685	617	523	825	2264	665	438
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	50
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	142	142	200	269	266	289	142	
MAINTENANCE								
-LABOR & MATERIAL	791	856	480	825	913	802	531	
TOTAL FIXED O&M COST		933	998	679	1093	1179	1091	723
OVERHEAD								
-PLANT	466	499	340	547	589	545	362	
-ADMINISTRATIVE	14	14	20	27	27	29	14	
-MARKETING	---	---	---	12	-8	9	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(123)	---	---	---	
-SULFUR	---	---	---	---	(-85)	(90)	---	
NET OPERATING COST		2098	2128	1562	2381	4135	2249	1537
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	4.46	4.82	4.45	5.04	5.63	5.09	3.88	
-LEVELIZED OPERATING COST (MILL/KWH)	4.88	4.95	3.63	5.54	9.61	5.23	3.57	
TOTAL LEVELIZED COST (MILL/KWH)		9.33	9.77	8.08	10.58	15.24	10.32	7.45

TABLE G-1.135 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: NAAC PLANT SIZE: 100 MW COAL: 1.25 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	529	1016	480	239	202	233	590
GAS HANDLING	2072	2059	2086	2271	2307	2466	2404
CHLORIDE PURGE	---	---	---	1410	735	---	---
SO2 ABSORPTION	4015	4233	3979	2359	3623	4140	6561
STACK GAS REHEAT	535	563	563	506	495	---	---
REGENERATION	---	---	87	2319	2607	2525	---
SLUDGE DISPOSAL	832	870	978	---	---	---	217
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1298	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1609	647	---
ESP CREDIT	---	---	---	---	---	---	(3016)
SERVICES, UTILITIES, MISC	479	525	490	624	695	601	405
SLUDGE POND	573	636	558	---	71	---	59
TOTAL DIRECT INVESTMENT	9036	9902	9220	11026	12343	10611	7221
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	813	891	830	992	1111	955	650
CONSTRUCTION EXPENSE	1446	1584	1475	1764	1975	1698	1155
CONTRACTOR FEES	452	495	461	551	617	531	361
CONTINGENCY	2349	2575	2397	2867	3209	3448	2447
ALLOWANCE FOR SHAKEDOWN	1352	1481	1383	1720	1918	1655	1120
INTEREST DURING CONSTRUCTION	2345	2570	2393	2862	3204	2754	1874
LAND	150	172	150	86	86	86	232
WORKING CAPITAL	70	58	58	88	188	66	51
TOTAL CAPITAL INVESTMENT	18014	19729	18367	21957	24652	21804	15111

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.136 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT	REGION: MAAC		PLANT SIZE: 100 MW		COAL: 1.25 % SULFUR		
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	279	---	266	---	---	---	308
-LIMESTONE	---	128	---	77	---	---	---
-SODA ASH	---	---	26	---	1182	106	---
-MAGNESIUM OXIDE	---	---	---	26	---	---	---
-COAL	---	---	---	---	---	117	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	337	359	171	349	327	461	304
-WATER	5	5	6	30	112	61	2
-STEAM	228	209	228	235	736	---	---
-FUEL OIL	---	---	---	385	---	154	---
-NATURAL GAS	---	---	---	---	13	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(47)	---
TOTAL VARIABLE O&M COST	850	702	698	1081	2370	852	614
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	60
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	127	127	180	240	237	258	127
MAINTENANCE							
-LABOR & MATERIAL	849	930	529	974	1086	932	563
TOTAL FIXED O&M COST	976	1057	710	1214	1323	1190	750
OVERHEAD							
-PLANT	488	528	355	607	662	595	375
-ADMINISTRATIVE	13	13	18	24	24	26	13
-MARKETING	---	---	---	28	3	21	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(282)	---	---	---
-SULFUR	---	---	---	---	(27)	(206)	---
NET OPERATING COST	2326	2300	1781	2672	4355	2477	1752
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.88	5.35	4.98	5.95	6.68	5.91	4.10
-LEVELIZED OPERATING COST (MILL/KWH)	5.41	5.35	4.14	6.21	10.12	5.76	4.07
TOTAL LEVELIZED COST (MILL/KWH)	10.29	10.70	9.12	12.16	16.81	11.67	8.17

TABLE G-1.137 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: MAIN

PLANT SIZE: 500 MW

COAL: 3.40 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARRONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3953	4884	3824	1465	1598	1839	4256
GAS HANDLING	8142	8143	7991	8707	8843	9453	9449
CHLORIDE PURGE	---	---	---	6235	3252	---	---
SO2 ABSORPTION	14563	15359	5868	9384	14375	16427	23688
STACK GAS REHEAT	2104	2092	2092	1962	1932	---	---
REGENERATION	---	---	494	12205	13696	13265	---
SLUDGE DISPOSAL	2181	2278	5183	---	---	---	1244
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9593	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	12341	4961	---
ESP CREDIT	---	---	---	---	---	---	(10630)
SERVICES, UTILITIES, MISC	1857	1965	2127	2973	3362	2757	1680
SLUDGE POND	4814	5537	4402	---	344	---	287
TOTAL DIRECT INVESTMENT	37614	40259	41982	52523	59743	48702	29975
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3385	3623	3778	4727	5377	4383	2698
CONSTRUCTION EXPENSE	6018	6441	6717	8404	9559	7792	4796
CONTRACTOR FEES	1881	2013	2099	2626	2987	2435	1499
CONTINGENCY	9780	10467	10915	13656	15533	15828	11356
ALLOWANCE FOR SHAKEDOWN	5386	5727	6109	8194	9286	7597	4647
INTEREST DURING CONSTRUCTION	9764	10451	10898	13634	15508	12642	7781
LAND	1803	2189	1795	85	85	85	1493
WORKING CAPITAL	617	443	585	1096	644	728	560
TOTAL CAPITAL INVESTMENT	76249	81612	84878	104944	118722	100192	64804

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.138 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: MAIN		PLANT SIZE: 500 MW		COAL: 3.40 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	4767	---	---	4540	---	---	---	5249
-LIMESTONE	---	2353	---	---	334	---	---	---
-SODA ASH	---	---	---	395	---	1086	1615	---
-MAGNESIUM OXIDE	---	---	---	---	450	---	---	---
-COAL	---	---	---	---	---	---	1973	---
-CATALYST	---	---	---	---	6	---	20	---
UTILITIES								
-ELECTRICITY	1538	1793	---	984	2133	1585	2228	1470
-WATER	33	35	---	33	372	758	364	11
-STEAM	1102	1172	---	1103	1134	3556	---	---
-FUEL OIL	---	---	---	---	9467	---	3771	---
-NATURAL GAS	---	---	---	---	---	1565	---	---
-HEAT CREDIT	---	---	---	---	(349)	(59)	(868)	---
TOTAL VARIABLE O&M COST	7440	5354	---	7054	13527	8492	9103	6731
(FIXED)								
WASTE DISPOSAL (TRUCKING)								
LABOR	---	---	---	---	---	---	---	493
-OPERATING, ANALYSIS, SUPERVISION	378	378	---	502	722	714	777	378
MAINTENANCE								
-LABOR & MATERIAL	2763	2939	---	1633	3667	4158	3381	1785
TOTAL FIXED O&M COST	3141	3316	---	2135	4389	4872	4157	2656
OVERHEAD								
-PLANT	1571	1558	---	1068	2195	2436	2079	1328
-ADMINISTRATIVE	38	38	---	50	72	71	78	38
-MARKETING	---	---	---	---	518	359	379	---
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	---	(5184)	---	---	---
-SULFUR	---	---	---	---	---	(3593)	(3791)	---
NET OPERATING COST	12189	10366	---	10307	15517	12636	12004	10752
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	4.13	4.43	---	4.60	5.69	6.44	5.43	3.51
-LEVELIZED OPERATING COST (MILL/KWH)	5.67	4.82	---	4.79	7.21	5.87	5.58	5.00
TOTAL LEVELIZED COST (MILL/KWH)	9.80	9.24	---	9.39	12.90	12.31	11.01	8.51

TABLE G-1.139 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT REGION: MAIN PLANT SIZE: 500 MW COAL: 1.10 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1545	2334	1451	632	614	707	1693
GAS HANDLING	8706	8710	8535	9300	9445	10096	10104
CHLORIDE PURGE	---	---	---	6666	3477	---	---
SO2 ABSORPTION	15515	16363	16977	10039	15377	17572	25232
STACK GAS REHEAT	2250	2232	2232	2097	2065	---	---
REGENERATION	---	---	221	5660	6356	6156	---
SLUDGE DISPOSAL	1397	1460	2396	---	---	---	555
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3802	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4807	1933	---
ESP CREDIT	---	---	---	---	---	---	(11251)
SERVICES, UTILITIES, MISC	1765	1866	1909	2292	2529	2188	1580
SLUDGE POND	1822	2060	1720	---	369	---	308
TOTAL DIRECT INVESTMENT	33000	35024	35440	40487	45039	38651	28220
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2970	3152	3190	3644	4054	3479	2540
CONSTRUCTION EXPENSE	5280	5604	5670	6478	7206	6184	4515
CONTRACTOR FEES	1650	1751	1772	2024	2252	1933	1411
CONTINGENCY	8580	9106	9214	10527	11710	12562	9486
ALLOWANCE FOR SHAKEDOWN	4966	5258	5357	6316	6989	6030	4372
INTEREST DURING CONSTRUCTION	8566	9092	9200	10510	11691	10033	7326
LAND	508	608	506	85	85	85	705
WORKING CAPITAL	335	299	279	481	569	340	245
TOTAL CAPITAL INVESTMENT	65856	69894	70628	80552	89596	79296	58819

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.140 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: MAIN

PLANT SIZE: 500 MW

COAL: 1.10 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1240	---	1181	---	---	---	1365
-LIMESTONE	---	612	---	334	---	---	---
-SODA ASH	---	---	103	---	1038	420	---
-MAGNESIUM OXIDE	---	---	---	117	---	---	---
-COAL	---	---	---	---	---	513	---
-CATALYST	---	---	---	2	---	5	---
UTILITIES							
-ELECTRICITY	1595	1801	885	1743	1642	2391	1578
-WATER	28	28	32	145	557	309	9
-STEAM	1183	1174	1184	1217	3817	---	---
-FUEL OIL	---	---	---	2462	---	981	---
-NATURAL GAS	---	---	---	---	347	---	---
-HEAT CREDIT	---	---	---	(96)	(13)	(226)	---
TOTAL VARIABLE O&M COST	4045	3615	3384	5923	7387	4394	2953
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	223
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	324	324	433	622	614	667	324
MAINTENANCE							
-LABOR & MATERIAL	2544	2694	1399	2827	3130	2683	1680
TOTAL FIXED O&M COST	2869	3018	1831	3449	3745	3350	2227
OVERHEAD							
-PLANT	1434	1509	916	1724	1872	1675	1114
-ADMINISTRATIVE	32	32	43	62	61	67	32
-MARKETING	---	---	---	135	80	99	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1348)	---	---	---
-SULFUR	---	---	---	---	(797)	(986)	---
NET OPERATING COST	8380	8175	6174	9945	12349	8599	6326
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.57	3.79	3.83	4.37	4.86	4.30	3.19
-LEVELIZED OPERATING COST (MILL/KWH)	3.90	3.80	2.87	4.62	5.74	4.00	2.94
TOTAL LEVELIZED COST (MILL/KWH)	7.47	7.59	6.70	8.99	10.60	8.30	6.13

TABLE G-1.141 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: MAIN		PLANT SIZE: 100 MW		COAL: 3.40 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1343	2093	1256	557	532	612	1476
GAS HANDLING	2123	2110	2136	2326	2363	2526	2463
CHLORIDE PURGE	---	---	---	1444	753	---	---
SO ₂ ABSORPTION	4108	4332	4078	2417	3712	4242	6713
STACK GAS REHEAT	548	576	576	518	507	---	---
REGENERATION	---	---	196	5043	5664	5486	---
SLUDGE DISPOSAL	1306	1365	2133	---	---	---	491
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3309	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4173	1677	---
ESP CREDIT	---	---	---	---	---	---	(3078)
SERVICES, UTILITIES, MISC	566	629	623	937	1062	873	484
SLUDGE POND	1572	1772	1489	---	73	---	61
TOTAL DIRECT INVESTMENT	11566	12876	12487	16552	18839	15416	8610
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1041	1159	1124	1490	1696	1387	775
CONSTRUCTION EXPENSE	1851	2060	1998	2648	3014	2467	1378
CONTRACTOR FEES	578	644	624	828	942	771	430
CONTINGENCY	3007	3348	3247	4303	4898	5010	3262
ALLOWANCE FOR SHAKEDOWN	1647	1832	1799	2582	2932	2405	1337
INTEREST DURING CONSTRUCTION	3002	3342	3242	4297	4890	4002	2235
LAND	425	507	423	85	85	85	359
WORKING CAPITAL	133	94	124	234	199	155	119
TOTAL CAPITAL INVESTMENT	23252	25861	25068	33017	37495	31696	18504

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.142 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: MAIN

PLANT SIZE: 100 MW

COAL: 3.40 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1013	---	964	---	---	---	1115
-LIMESTONE	---	500	---	71	---	---	---
-SODA ASH	---	---	84	---	1030	343	---
-MAGNESIUM OXIDE	---	---	---	96	---	---	---
-COAL	---	---	---	---	---	419	---
-CATALYST	---	---	---	1	---	4	---
UTILITIES							
-ELECTRICITY	355	392	209	463	347	473	312
-WATER	7	7	7	79	164	77	2
-STEAM	234	232	234	241	755	---	---
-FUEL OIL	---	---	---	2011	---	801	---
-NATURAL GAS	---	---	---	---	269	---	---
-HEAT CREDIT	---	---	---	(78)	(10)	(184)	---
TOTAL VARIABLE O&M COST	1608	1132	1499	2884	2556	1934	1430
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	105
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	177	177	245	334	330	361	177
MAINTENANCE							
-LABOR & MATERIAL	1029	1144	695	1462	1660	1354	672
TOTAL FIXED O&M COST	1206	1321	940	1796	1990	1714	954
OVERHEAD							
-PLANT	603	561	470	898	995	857	477
-ADMINISTRATIVE	18	18	24	33	33	36	18
-MARKETING	---	---	---	110	62	81	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1101)	---	---	---
-SULFUR	---	---	---	---	(617)	(805)	---
NET OPERATING COST	3435	3131	2934	4620	5018	3816	2878
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	6.30	7.01	6.80	8.95	10.17	8.59	5.02
-LEVELIZED OPERATING COST (MILL/KWH)	7.98	7.28	6.82	10.74	11.66	8.87	6.69
TOTAL LEVELIZED COST (MILL/KWH)	14.29	14.29	13.62	19.69	21.83	17.46	11.71

APPLICATION: RETROFIT

REGION: MAIN

PLANT SIZE: 100 MW

COAL: 1.10 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	534	1024	485	242	204	235	595
GAS HANDLING	2270	2257	2281	2484	2524	2498	2633
CHLORIDE PURGE	---	---	---	1544	806	---	---
SO2 ABSORPTION	4377	4615	4363	2586	3971	4538	7151
STACK GAS REHEAT	586	615	615	554	542	---	---
REGENERATION	---	---	88	2338	2629	2546	---
SLUDGE DISPOSAL	836	875	986	---	---	---	219
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1312	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1625	653	---
ESP CREDIT	---	---	---	---	---	---	(3258)
SERVICES, UTILITIES, MISC	516	563	529	664	738	640	440
SLUDGE POND	580	643	564	---	78	---	65
TOTAL DIRECT INVESTMENT	9699	10591	9910	11724	13117	11310	7846
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	873	953	892	1055	1180	1018	706
CONSTRUCTION EXPENSE	1552	1695	1586	1876	2099	1810	1255
CONTRACTOR FEES	485	530	496	586	656	566	392
CONTINGENCY	2522	2754	2577	3048	3410	3676	2637
ALLOWANCE FOR SHAKEDOWN	1455	1588	1490	1829	2038	1764	1217
INTEREST DURING CONSTRUCTION	2518	2749	2573	3043	3405	2936	2037
LAND	150	171	149	85	85	85	192
WORKING CAPITAL	74	63	59	103	181	72	52
TOTAL CAPITAL INVESTMENT	19327	21093	19731	23349	26171	23236	16335

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.144 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: MAIN		PLANT SIZE: 100 MW		COAL: 1.10 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	263	---	251	---	---	---	---	290
-LIMESTONE	---	130	---	71	---	---	---	---
-SODA ASH	---	---	22	---	984	89	---	---
-MAGNESIUM OXIDE	---	---	---	25	---	---	---	---
-COAL	---	---	---	---	---	109	---	---
-CATALYST	---	---	---	0	---	1	---	---
UTILITIES								
-ELECTRICITY	369	394	188	381	360	508	335	
-WATER	6	6	7	31	122	66	2	
-STEAM	251	231	252	259	811	---	---	
-FUEL OIL	---	---	---	523	---	208	---	
-NATURAL GAS	---	---	---	---	13	---	---	
-HEAT CREDIT	---	---	---	(20)	(0)	(48)	---	
TOTAL VARIABLE O&M COST		889	762	719	1269	2289	933	627
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	47
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	123	123	176	234	231	251	123	
MAINTENANCE								
-LABOR & MATERIAL	914	997	570	1035	1154	993	612	
TOTAL FIXED O&M COST		1037	1120	746	1269	1385	1244	783
OVERHEAD								
-PLANT	519	560	373	635	692	622	392	
-ADMINISTRATIVE	12	12	18	23	23	25	12	
-MARKETING	---	---	---	29	3	21	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(286)	---	---	---	
-SULFUR	---	---	---	---	(30)	(209)	---	
NET OPERATING COST		2457	2454	1855	2939	4363	2637	1814
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL./KWH)	5.24	5.72	5.35	6.33	7.10	6.30	4.43	
-LEVELIZED OPERATING COST (MILL./KWH)	5.71	5.71	4.31	6.83	10.14	6.13	4.22	
TOTAL LEVELIZED COST (MILL./KWH)		10.95	11.42	9.66	13.16	17.24	12.43	8.65

TABLE G-1.145 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: MARCA-1

PLANT SIZE: 500 MW

COAL: 0.95 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	862	1483	794	373	336	387	954
GAS HANDLING	12907	12936	12571	13699	13912	14871	14982
CHLORIDE PURGE	---	---	---	9885	5155	---	---
SO2 ABSORPTION	22522	23754	25270	14933	22858	26121	36581
STACK GAS REHEAT	3337	3260	3260	3098	3057	---	---
REGENERATION	---	---	133	3490	3922	3798	---
SLUDGE DISPOSAL	1055	1103	1474	---	---	---	334
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2124	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2657	1068	---
ESP CREDIT	---	---	---	---	---	---	(15710)
SERVICES, UTILITIES, MISC	2441	2552	2610	2856	3114	2775	2228
SLUDGE POND	977	1093	938	---	560	---	467
TOTAL DIRECT INVESTMENT	44101	46180	47051	50459	55572	49020	39835
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3969	4156	4235	4541	5001	4412	3585
CONSTRUCTION EXPENSE	7056	7389	7528	8073	8891	7843	6374
CONTRACTOR FEES	2205	2309	2353	2523	2779	2451	1992
CONTINGENCY	11466	12007	12233	13119	14449	15932	13279
ALLOWANCE FOR SHAKEDOWN	6782	7095	7246	7872	8613	7647	6168
INTEREST DURING CONSTRUCTION	11448	11988	12214	13098	14426	12725	10341
LAND	50	59	50	17	17	17	188
WORKING CAPITAL	396	415	309	469	778	348	256
TOTAL CAPITAL INVESTMENT	87475	91597	93218	100171	110525	100395	82017

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.146 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: MARCA-1

PLANT SIZE: 500 MW

COAL: 0.95 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	613	---	584	---	---	---	675
-LIMESTONE	---	525	---	386	---	---	---
-SODA ASH	---	---	45	---	1035	185	---
-MAGNESIUM OXIDE	---	---	---	48	---	---	---
-COAL	---	---	---	---	---	82	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	2349	2670	1283	2435	2452	3630	2396
-WATER	39	39	47	130	749	461	14
-STEAM	1796	1787	1797	1847	5794	---	---
-FUEL OIL	---	---	---	951	---	379	---
-NATURAL GAS	---	---	---	---	63	---	---
-HEAT CREDIT	---	---	---	(41)	(4)	(97)	---
TOTAL VARIABLE O&M COST	4797	5021	3756	5757	10088	4641	3085
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	300
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	321	321	428	615	608	660	321
MAINTENANCE							
-LABOR & MATERIAL	3473	3633	1870	3523	3858	3403	2370
TOTAL FIXED O&M COST	3794	3954	2298	4138	4466	4063	2991
OVERHEAD							
-PLANT	1897	1977	1149	2069	2233	2031	1496
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	58	24	42	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(578)	---	---	---
-SULFUR	---	---	---	---	(239)	(423)	---
NET OPERATING COST	10519	10983	7247	11506	16633	10421	7604
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.74	4.97	5.05	5.43	5.99	5.44	4.45
-LEVELIZED OPERATING COST (MILL/KWH)	4.89	5.11	3.37	3.35	7.73	4.84	3.54
TOTAL LEVELIZED COST (MILL/KWH)	9.63	10.07	8.42	10.78	13.73	10.29	7.98

TABLE 3-1.147 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: MARCA-1

PLANT SIZE: 500 MW

COAL: 0.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1491	2270	1398	612	592	682	1635
GAS HANDLING	10550	10564	10309	11234	11409	12196	12244
CHLORIDE PURGE	---	---	---	8079	4213	---	---
SO ₂ ABSORPTION	18609	19626	20613	12185	18658	21321	30244
STACK GAS REHEAT	2727	2685	2685	2537	2501	---	---
REGENERATION	---	---	215	5496	6173	5979	---
SLUDGE DISPOSAL	1373	1435	2326	---	---	---	538
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3671	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4638	1864	---
ESP CREDIT	---	---	---	---	---	---	(13241)
SERVICES, UTILITIES, MISC	2085	2195	2253	2429	2891	2523	1885
SLUDGE POND	1755	1983	1658	---	452	---	377
TOTAL DIRECT INVESTMENT	38591	40758	41458	46442	51528	44564	33683
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3473	3668	3731	4180	4638	4011	3031
CONSTRUCTION EXPENSE	6175	6521	6633	7431	8244	7130	5389
CONTRACTOR FEES	1930	2038	2073	2322	2576	2228	1684
CONTINGENCY	10034	10597	10779	12075	13397	14483	11103
ALLOWANCE FOR SHAKEDOWN	5845	6160	6302	7245	7993	6952	5217
INTEREST DURING CONSTRUCTION	10018	10580	10762	12056	13376	11568	8744
LAND	98	117	98	17	17	17	173
WORKING CAPITAL	395	400	326	507	660	346	286
TOTAL CAPITAL INVESTMENT	76556	80839	82161	92274	102430	91300	69310

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.148 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: MARCA-1		PLANT SIZE: 500 MW		COAL: 0.75 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST								
(VARIABLE)								
RAW MATERIAL								
-LIME	1359	---	---	1294	---	---	---	1496
-LIMESTONE	---	1163	---	---	386	---	---	---
-SODA ASH	---	---	---	100	---	1063	409	---
-MAGNESIUM OXIDE	---	---	---	---	107	---	---	---
-COAL	---	---	---	---	---	---	182	---
-CATALYST	---	---	---	---	2	---	2	---
UTILITIES								
-ELECTRICITY	1929	2188	1069	2080	1999	2931	1935	
-WATER	33	33	39	155	657	364	11	
-STEAM	1450	1445	1451	1492	4679	---	---	
-FUEL OIL	---	---	---	2107	---	839	---	
-NATURAL GAS	---	---	---	---	197	---	---	
-HEAT CREDIT	---	---	---	(91)	(12)	(214)	---	
TOTAL VARIABLE O&M COST		4771	4830	3954	6236	8583	4513	3442
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	275
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	316	316	422	607	599	650	316	
MAINTENANCE								
-LABOR & MATERIAL	2994	3156	1640	3243	3580	3094	2004	
TOTAL FIXED O&M COST		3310	3472	2062	3849	4179	3744	2596
OVERHEAD								
-PLANT	1655	1736	1031	1925	2090	1872	1298	
-ADMINISTRATIVE	32	32	42	61	60	65	32	
-MARKETING	---	---	---	128	75	94	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1281)	---	---	---	
-SULFUR	---	---	---	---	(748)	(937)	---	
NET OPERATING COST		9768	10069	7089	10918	14239	9351	7368
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	4.15	4.38	4.46	5.00	5.55	4.95	3.76	
-LEVELIZED OPERATING COST (MILL/KWH)	4.54	4.68	3.30	5.08	6.62	4.35	3.43	
TOTAL LEVELIZED COST (MILL/KWH)		8.69	9.06	7.75	10.08	12.17	9.30	7.18

TABLE 8-1.149 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: MARCA-1

PLANT SIZE: 100 MW

COAL: 0.95 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	301	660	269	143	112	129	339
GAS HANDLING	3366	3351	3360	3660	3717	3973	3905
CHLORIDE PURGE	---	---	---	2290	1194	---	---
SO2 ABSORPTION	6353	6699	6494	3847	5903	6746	10367
STACK GAS REHEAT	869	898	898	818	802	---	---
REGENERATION	---	---	53	1442	1622	1571	---
SLUDGE DISPOSAL	632	661	607	---	---	---	132
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	733	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	898	361	---
ESP CREDIT	---	---	---	---	---	---	(4549)
SERVICES, UTILITIES, MISC	691	736	701	776	855	767	612
SLUDGE POND	307	337	303	---	119	---	99
TOTAL DIRECT INVESTMENT	12520	13343	12684	13708	15222	13546	10903
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1127	1201	1142	1234	1370	1219	981
CONSTRUCTION EXPENSE	2003	2135	2030	2193	2436	2167	1745
CONTRACTOR FEES	626	667	634	685	761	677	545
CONTINGENCY	3255	3469	3298	3564	3958	4403	3635
ALLOWANCE FOR SHAKEDOWN	1922	2048	1948	2138	2363	2113	1691
INTEREST DURING CONSTRUCTION	3250	3464	3293	3558	3951	3516	2830
LAND	19	21	19	17	17	17	48
WORKING CAPITAL	88	87	66	101	227	74	54
TOTAL CAPITAL INVESTMENT	24810	26435	25113	27200	30305	27734	22433

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.150 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: MARCA-1 PLANT SIZE: 100 MW COAL: 0.95 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	130	---	124	---	---	---	143
-LIMESTONE	---	111	---	82	---	---	---
-SODA ASH	---	---	10	---	981	39	---
-MAGNESIUM OXIDE	---	---	---	10	---	---	---
-COAL	---	---	---	---	---	17	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	543	585	273	533	537	771	509
-WATER	8	8	10	28	164	98	3
-STEAM	382	352	382	392	1231	---	---
-FUEL OIL	---	---	---	202	---	80	---
-NATURAL GAS	---	---	---	---	-22	---	---
-HEAT CREDIT	---	---	---	(9)	(-1)	(21)	---
TOTAL VARIABLE O&M COST	1063	1056	798	1240	2893	986	655
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	64
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	120	120	171	227	225	244	120
MAINTENANCE							
-LABOR & MATERIAL	1209	1288	742	1211	1337	1189	850
TOTAL FIXED O&M COST	1329	1408	913	1438	1562	1434	1034
OVERHEAD							
-PLANT	665	704	457	719	781	717	517
-ADMINISTRATIVE	12	12	17	23	22	24	12
-MARKETING	---	---	---	12	-8	9	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(123)	---	---	---
-SULFUR	---	---	---	---	(-85)	(90)	---
NET OPERATING COST	3069	3180	2185	3308	5335	3080	2218
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	6.73	7.17	6.81	7.37	8.22	7.52	6.08
-LEVELIZED OPERATING COST (MILL/KWH)	7.13	7.39	5.08	7.69	12.40	7.16	5.16
TOTAL LEVELIZED COST (MILL/KWH)	13.86	14.56	11.89	15.06	20.62	14.68	11.24

TABLE 0-1.151 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: MARCA-1

PLANT SIZE: 100 MW

COAL: 0.75 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	516	997	468	234	197	227	575
GAS HANDLING	2751	2737	2755	3001	3048	3259	3192
CHLORIDE PURGE	---	---	---	1872	976	---	---
SO ₂ ABSORPTION	5249	5535	5298	3139	4818	5506	8571
STACK GAS REHEAT	711	740	740	670	656	---	---
REGENERATION	---	---	85	2271	2553	2472	---
SLUDGE DISPOSAL	822	860	957	---	---	---	212
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1266	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1568	630	---
ESP CREDIT	---	---	---	---	---	---	(3834)
SERVICES, UTILITIES, MISC	603	652	618	747	829	726	523
SLUDGE POND	558	618	543	---	96	---	80
TOTAL DIRECT INVESTMENT	11210	12139	11464	13200	14742	12820	9319
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1009	1093	1032	1188	1327	1154	839
CONSTRUCTION EXPENSE	1794	1942	1834	2112	2359	2051	1491
CONTRACTOR FEES	560	607	573	660	737	641	466
CONTINGENCY	2915	3156	2981	3432	3833	4166	3072
ALLOWANCE FOR SHAKEDOWN	1693	1832	1734	2059	2290	2000	1446
INTEREST DURING CONSTRUCTION	2910	3151	2976	3426	3827	3328	2419
LAND	29	33	29	17	17	17	45
WORKING CAPITAL	87	84	69	109	204	73	61
TOTAL CAPITAL INVESTMENT	22206	24037	22692	26203	29335	26251	19157

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.152 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: MARCA-1

PLANT SIZE: 100 MW

COAL: 0.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	289	---	275	---	---	---	318
-LIMESTONE	---	247	---	82	---	---	---
-SODA ASH	---	---	21	---	1008	87	---
-MAGNESIUM OXIDE	---	---	---	23	---	---	---
-COAL	---	---	---	---	---	39	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	446	479	227	455	438	623	411
-WATER	7	7	8	33	144	77	2
-STEAM	308	285	308	317	994	---	---
-FUEL OIL	---	---	---	448	---	178	---
-NATURAL GAS	---	---	---	---	5	---	---
-HEAT CREDIT	---	---	---	(19)	(0)	(46)	---
TOTAL VARIABLE O&M COST	1050	1018	840	1338	2589	959	731
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	58
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	115	115	165	218	216	235	115
MAINTENANCE							
-LABOR & MATERIAL	1063	1151	662	1166	1296	1126	727
TOTAL FIXED O&M COST	1179	1266	828	1384	1512	1360	901
OVERHEAD							
-PLANT	589	633	414	692	756	680	450
-ADMINISTRATIVE	12	12	17	22	22	23	12
-MARKETING	---	---	---	27	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(272)	---	---	---
-SULFUR	---	---	---	---	(20)	(199)	---
NET OPERATING COST	2830	2929	2098	3192	4862	2844	2094
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL./KWH)	6.02	6.52	6.15	7.10	7.95	7.12	5.19
-LEVELIZED OPERATING COST (MILL./KWH)	6.58	6.81	4.88	7.42	11.30	6.61	4.87
TOTAL LEVELIZED COST (MILL./KWH)	12.60	13.32	11.03	14.52	19.25	13.73	10.06

APPLICATION: RETROFIT

REGION: MARCA-2

PLANT SIZE: 500 MW

COAL: 3.50 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3957	4888	3828	1466	1599	1841	4261
GAS HANDLING	8849	8853	8673	9450	9597	10259	10269
CHLORIDE PURGE	---	---	---	6776	3534	---	---
SO2 ABSORPTION	15756	16617	17259	10205	15631	17862	25622
STACK GAS REHEAT	2287	2267	2267	2131	2099	---	---
REGENERATION	---	---	495	12216	13709	13277	---
SLUDGE DISPOSAL	2183	2280	5188	---	---	---	1245
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9603	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	12355	4967	---
ESP CREDIT	---	---	---	---	---	---	11407
SERVICES, UTILITIES, MISC	1982	2094	2263	3111	3511	2892	1799
SLUDGE POND	4819	5543	4406	---	375	---	313
TOTAL DIRECT INVESTMENT	39832	42542	44378	54958	62411	51098	32103
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3585	3829	3994	4946	5617	4599	2889
CONSTRUCTION EXPENSE	6373	6807	7100	8793	9986	8176	5136
CONTRACTOR FEES	1992	2127	2219	2748	3121	2555	1605
CONTINGENCY	10356	11061	11538	14289	16227	16607	12222
ALLOWANCE FOR SHAKEDOWN	5732	6082	6482	8573	9699	7971	4977
INTEREST DURING CONSTRUCTION	10340	11043	11520	14266	16201	13264	8333
LAND	2266	2750	2256	106	106	106	1740
WORKING CAPITAL	744	661	702	1009	680	685	690
TOTAL CAPITAL INVESTMENT	81220	86902	90190	109689	124046	105061	69695

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.154 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: MARCA-2 PLANT SIZE: 500 MW COAL: 3.50 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LINE	6060	---	5771	---	---	---	6673
-LIMESTONE	---	4714	---	424	---	---	---
-SODA ASH	---	---	399	---	1096	1631	---
-MAGNESIUM OXIDE	---	---	---	438	---	---	---
-COAL	---	---	---	---	---	1775	---
-CATALYST	---	---	---	6	---	18	---
UTILITIES							
-ELECTRICITY	1666	1942	1055	2266	1722	2433	1606
-WATER	35	37	36	378	799	401	12
-STEAM	1204	1276	1205	1238	3884	---	---
-FUEL OIL	---	---	---	8115	---	3233	---
-NATURAL GAS	---	---	---	---	1517	---	---
-HEAT CREDIT	---	---	---	(370)	(60)	(869)	---
TOTAL VARIABLE O&M COST	8965	7968	8466	12495	8957	8622	8291
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	457
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	380	380	505	726	718	781	380
MAINTENANCE							
-LABOR & MATERIAL	2940	3120	1729	3837	4343	3547	1912
TOTAL FIXED O&M COST	3320	3500	2234	4564	5061	4328	2749
OVERHEAD							
-PLANT	1660	1750	1117	2282	2530	2164	1374
-ADMINISTRATIVE	38	38	50	73	72	78	38
-MARKETING	---	---	---	519	360	380	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5192)	---	---	---
-SULFUR	---	---	---	---	(3599)	(3798)	---
NET OPERATING COST	13984	13257	11867	14740	13381	11775	12452
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.40	4.71	4.89	5.95	6.73	5.70	3.78
-LEVELIZED OPERATING COST (MILL/KWH)	6.50	6.16	5.52	6.85	6.22	5.47	5.79
TOTAL LEVELIZED COST (MILL/KWH)	10.90	10.88	10.41	12.80	12.95	11.17	9.57

TABLE G-1.155 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: MARCA-2 PLANT SIZE: 500 MW COAL: 1.00 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1534	2321	1440	628	609	702	1681
GAS HANDLING	9527	9535	9326	10162	10321	11032	11057
CHLORIDE PURGE	---	---	---	7296	3805	---	---
SO2 ABSORPTION	16897	17821	18596	10994	16838	19241	27471
STACK GAS REHEAT	2463	2434	2434	2293	2259	---	---
REGENERATION	---	---	220	5626	6318	6119	---
SLUDGE DISPOSAL	1392	1455	2381	---	---	---	551
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3775	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4772	1918	---
ESP CREDIT	---	---	---	---	---	---	(12145)
SERVICES, UTILITIES, MISC	1909	2014	2064	2446	2695	2341	1717
SLUDGE POND	1809	2044	1707	---	406	---	338
TOTAL DIRECT INVESTMENT	35530	37623	38168	43220	48024	41354	30672
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3198	3386	3435	3890	4322	3722	2760
CONSTRUCTION EXPENSE	5685	6020	6107	6915	7684	6617	4907
CONTRACTOR FEES	1777	1881	1908	2161	2401	2068	1534
CONTINGENCY	9238	9782	9924	11237	12486	13440	10253
ALLOWANCE FOR SHAKEDOWN	5362	5665	5783	6742	7451	6451	4751
INTEREST DURING CONSTRUCTION	9223	9766	9908	11219	12466	10735	7962
LAND	632	756	629	106	106	106	875
WORKING CAPITAL	383	373	321	480	614	343	287
TOTAL CAPITAL INVESTMENT	71027	75253	76183	85971	95556	84835	64002

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.156 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: MARCA-2		PLANT SIZE: 500 MW		COAL: 1.00 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LINE	1557	---	---	1483	---	---	---	1715
-LIMESTONE	---	1211	---	---	424	---	---	---
-SODA ASH	---	---	---	102	---	1046	419	---
-MAGNESIUM OXIDE	---	---	---	---	112	---	---	---
-COAL	---	---	---	---	---	---	456	---
-CATALYST	---	---	---	---	2	---	5	---
UTILITIES								
-ELECTRICITY	1744	1974	967	1895	1801	2631	1737	
-WATER	30	30	35	150	602	336	10	
-STEAM	1302	1294	1303	1339	4200	---	---	
-FUEL OIL	---	---	---	2085	---	831	---	
-NATURAL GAS	---	---	---	---	331	---	---	
-HEAT CREDIT	---	---	---	(95)	(13)	(223)	---	
TOTAL VARIABLE O&M COST		4633	4510	3890	5912	7968	4455	3462
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	221
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	322	322	430	617	610	662	322	
MAINTENANCE								
-LABOR & MATERIAL	2747	2902	1508	3018	3337	2871	1825	
TOTAL FIXED O&M COST		3069	3224	1937	3635	3947	3533	2368
OVERHEAD								
-PLANT	1534	1612	969	1818	1974	1767	1184	
-ADMINISTRATIVE	32	32	43	62	61	66	32	
-MARKETING	---	---	---	133	79	98	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1334)	---	---	---	
-SULFUR	---	---	---	---	(786)	(976)	---	
NET OPERATING COST		9268	9378	6839	10226	13242	8942	7046
LEVELIZED - 20 YEARS								

-LEVELIZED CAPITAL COST (MILL/KWH)	3.85	4.08	4.13	4.66	5.18	4.60	3.47	
-LEVELIZED OPERATING COST (MILL/KWH)	4.31	4.36	3.18	4.75	6.16	4.16	3.28	
TOTAL LEVELIZED COST (MILL/KWH)		8.16	8.44	7.31	9.42	11.34	8.76	6.75

APPLICATION: RETROFIT

REGION: MARCA-2

PLANT SIZE: 100 MW

COAL: 3.50 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1345	2095	1257	558	532	613	1478
GAS HANDLING	2307	2294	2318	2524	2564	2741	2677
CHLORIDE PURGE	---	---	---	1570	819	---	---
SO ₂ ABSORPTION	4444	4687	4435	2629	4037	4613	7261
STACK GAS REHEAT	596	624	624	563	551	---	---
REGENERATION	---	---	196	5047	5669	5491	---
SLUDGE DISPOSAL	1307	1366	2135	---	---	---	492
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3312	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4177	1679	---
ESP CREDIT	---	---	---	---	---	---	(3303)
SERVICES, UTILITIES, MISC	600	664	658	972	1101	908	516
SLUDGE POND	1573	1774	1491	---	80	---	66
TOTAL DIRECT INVESTMENT	12173	13503	13116	17175	19530	16045	9186
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1096	1215	1180	1546	1758	1444	827
CONSTRUCTION EXPENSE	1948	2160	2099	2748	3125	2567	1470
CONTRACTOR FEES	609	675	656	859	976	802	459
CONTINGENCY	3165	3511	3410	4466	5078	5215	3497
ALLOWANCE FOR SHAKEDOWN	1742	1929	1897	2679	3039	2503	1426
INTEREST DURING CONSTRUCTION	3160	3505	3405	4458	5070	4165	2385
LARD	534	637	532	106	106	106	422
WORKING CAPITAL	161	140	149	215	208	145	147
TOTAL CAPITAL INVESTMENT	24586	27275	26443	34253	38889	32992	19819

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.158 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT		REGION: MARCA-2		PLANT SIZE: 100 MW		COAL: 3.50 % SULFUR	
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							

(VARIABLE)							
RAW MATERIAL							
-LIME	1287	---	1226	---	---	---	1418
-LIMESTONE	---	1001	---	90	---	---	---
-SODA ASH	---	---	85	---	1039	347	---
-MAGNESIUM OXIDE	---	---	---	93	---	---	---
-COAL	---	---	---	---	---	377	---
-CATALYST	---	---	---	1	---	4	---
UTILITIES							
-ELECTRICITY	384	425	224	492	377	517	341
-WATER	7	8	8	81	173	85	3
-STEAM	256	253	256	263	825	---	---
-FUEL OIL	---	---	---	1724	---	687	---
-NATURAL GAS	---	---	---	---	261	---	---
-HEAT CREDIT	---	---	---	(79)	(10)	(185)	---
TOTAL VARIABLE O&M COST	1935	1686	1798	2666	2665	1832	1761
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	97
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	179	179	248	338	335	365	179
MAINTENANCE							
-LABOR & MATERIAL	1089	1206	733	1517	1720	1409	717
TOTAL FIXED O&M COST	1268	1385	980	1855	2055	1774	993
OVERHEAD							
-PLANT	634	692	490	928	1027	887	497
-ADMINISTRATIVE	18	18	25	34	33	37	18
-MARKETING	---	---	---	110	62	81	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1103)	---	---	---
-SULFUR	---	---	---	---	(419)	(807)	---
NET OPERATING COST	3854	3781	3294	4490	5224	3804	3269
LEVELIZED - 20 YEARS							

-LEVELIZED CAPITAL COST (MILL/KWH)	6.67	7.39	7.17	9.29	10.54	8.94	5.37
-LEVELIZED OPERATING COST (MILL/KWH)	8.96	8.79	7.66	10.44	12.14	8.84	7.60
TOTAL LEVELIZED COST (MILL/KWH)	15.63	16.18	14.83	19.72	22.69	17.79	12.97

TABLE G-1.159 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: MARCA-2		PLANT SIZE: 100 MW		COAL: 1.00 % SULFUR	
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	530	1019	481	240	203	234	591
GAS HANDLING	2484	2470	2493	2715	2758	2948	2882
CHLORIDE PURGE	---	---	---	1690	882	---	---
SO2 ABSORPTION	4746	5026	4779	2832	4348	4969	7785
STACK GAS REHEAT	642	670	670	606	593	---	---
REGENERATION	---	---	87	2324	2613	2531	---
SLUDGE DISPOSAL	834	872	980	---	---	---	218
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1302	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1614	649	---
ESP CREDIT	---	---	---	---	---	---	(3517)
SERVICES, UTILITIES, MISC	555	603	569	703	781	680	478
SLUDGE POND	575	638	559	---	86	---	72
TOTAL DIRECT INVESTMENT	10387	11298	10620	12412	13876	12009	8508
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	935	1017	956	1117	1249	1081	766
CONSTRUCTION EXPENSE	1662	1808	1699	1986	2220	1921	1361
CONTRACTOR FEES	519	565	531	621	694	600	425
CONTINGENCY	2701	2938	2761	3227	3608	3903	2844
ALLOWANCE FOR SHUTDOWN	1563	1699	1601	1936	2156	1873	1320
INTEREST DURING CONSTRUCTION	2696	2933	2757	3222	3602	3117	2209
LAND	187	213	186	106	106	106	238
WORKING CAPITAL	84	79	68	103	191	73	61
TOTAL CAPITAL INVESTMENT	20733	22549	21178	24730	27702	24685	17733

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.160 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: MARCA-2

PLANT SIZE: 100 MW

COAL: 1.00 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	331	---	315	---	---	---	364
-LIMESTONE	---	257	---	90	---	---	---
-SODA ASH	---	---	22	---	993	89	---
-MAGNESIUM OXIDE	---	---	---	24	---	---	---
-COAL	---	---	---	---	---	97	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	403	432	205	414	395	559	369
-WATER	6	6	7	32	132	71	2
-STEAM	277	255	277	284	892	---	---
-FUEL OIL	---	---	---	443	---	176	---
-NATURAL GAS	---	---	---	---	12	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(47)	---
TOTAL VARIABLE O&M COST	1017	951	826	1268	2422	946	735
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	47
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	121	121	173	229	227	247	121
MAINTENANCE							
-LABOR & MATERIAL	981	1067	612	1096	1220	1054	664
TOTAL FIXED O&M COST	1103	1188	785	1325	1447	1301	832
OVERHEAD							
-PLANT	551	594	392	663	724	651	416
-ADMINISTRATIVE	12	12	17	23	23	25	12
-MARKETING	---	---	---	28	3	21	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(283)	---	---	---
-SULFUR	---	---	---	---	(28)	(207)	---
NET OPERATING COST	2683	2745	2021	3024	4591	2736	1995
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.62	6.11	5.74	6.70	7.51	6.69	4.81
-LEVELIZED OPERATING COST (MILL/KWH)	6.24	6.38	4.70	7.03	10.67	6.36	4.64
TOTAL LEVELIZED COST (MILL/KWH)	11.86	12.49	10.44	13.73	18.18	13.05	9.45

TABLE G-1.161 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: NPCC

PLANT SIZE: 500 MW

COAL: 1.90 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	862	1483	794	373	336	387	954
GAS HANDLING	8054	8055	7906	8614	8749	9352	9346
CHLORIDE PURGE	---	---	---	6167	3216	---	---
SO2 ABSORPTION	14413	15201	15694	9281	14218	16247	23446
STACK GAS REHEAT	2082	2070	2070	1941	1911	---	---
REGENERATION	---	---	133	3490	3922	3798	---
SLUDGE DISPOSAL	1055	1103	1474	---	---	---	334
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2124	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2657	1068	---
ESP CREDIT	---	---	---	---	---	---	(10532)
SERVICES, UTILITIES, MISC	1588	1675	1684	1919	2101	1851	1413
SLUDGE POND	977	1093	938	---	340	---	283
TOTAL DIRECT INVESTMENT	29031	30679	30694	33910	37449	32704	25244
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2613	2761	2762	3052	3370	2943	2272
CONSTRUCTION EXPENSE	4645	4909	4911	5426	5992	5233	4039
CONTRACTOR FEES	1452	1534	1535	1695	1872	1635	1262
CONTINGENCY	7548	7976	7980	8817	9737	10629	8860
ALLOWANCE FOR SHAKEDOWN	4431	4677	4695	5290	5808	5102	3910
INTEREST DURING CONSTRUCTION	7536	7964	7968	8802	9721	8489	6553
LAND	251	295	250	86	86	86	664
WORKING CAPITAL	282	261	227	328	530	244	197
TOTAL CAPITAL INVESTMENT	57788	61055	61022	67405	74566	67065	53001

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.162 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: NPCC

PLANT SIZE: 500 MW

COAL: 1.90 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	828	---	788	---	---	---	911
-LIMESTONE	---	429	---	521	---	---	---
-SODA ASH	---	---	54	---	1247	223	---
-MAGNESIUM OXIDE	---	---	---	52	---	---	---
-COAL	---	---	---	---	---	294	---
-CATALYST	---	---	---	1	---	3	---
UTILITIES							
-ELECTRICITY	1467	1642	787	1521	1505	2202	1453
-WATER	24	24	29	93	473	311	10
-STEAM	1089	1063	1090	1120	3515	---	---
-FUEL OIL	---	---	---	760	---	303	---
-NATURAL GAS	---	---	---	---	102	---	---
-HEAT CREDIT	---	---	---	(41)	(4)	(97)	---
TOTAL VARIABLE O&M COST	3408	3158	2749	4028	6839	3239	2374
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	206
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	343	343	457	657	649	705	343
MAINTENANCE							
-LABOR & MATERIAL	2269	2395	1217	2368	2601	2270	1502
TOTAL FIXED O&M COST	2612	2738	1674	3024	3250	2975	2051
OVERHEAD							
-PLANT	1306	1369	837	1512	1625	1488	1026
-ADMINISTRATIVE	34	34	46	66	65	71	34
-MARKETING	---	---	---	58	24	42	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(578)	---	---	---
-SULFUR	---	---	---	---	239)	(423)	---
NET OPERATING COST	7361	7299	5305	8111	11564	7393	5486
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.13	3.31	3.31	3.65	4.04	3.64	2.87
-LEVELIZED OPERATING COST (MILL/KWH)	3.42	3.39	2.47	3.77	5.38	3.44	2.55
TOTAL LEVELIZED COST (MILL/KWH)	6.56	6.70	5.78	7.43	9.42	7.07	5.42

TABLE G-1.163 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: NPCC PLANT SIZE: 500 MW COAL: 1.25 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1521	2305	1427	623	604	695	1667
GAS HANDLING	8026	8027	7880	8586	8720	9321	9315
CHLORIDE PURGE	---	---	---	6146	3205	---	---
SO2 ABSORPTION	14367	15152	15640	9249	14169	16192	23371
STACK GAS REHEAT	2074	2064	2064	1935	1905	---	---
REGENERATION	---	---	218	5586	6274	6076	---
SLUDGE DISPOSAL	1386	1449	2364	---	---	---	547
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3743	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4731	1902	---
ESP CREDIT	---	---	---	---	---	---	(10502)
SERVICES, UTILITIES, MISC	1643	1740	1776	2152	2376	2051	1464
SLUDGE POND	1792	2025	1692	---	339	---	282
TOTAL DIRECT INVESTMENT	30810	32762	33061	38019	42323	36237	26144
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2773	2949	2975	3422	3809	3261	2353
CONSTRUCTION EXPENSE	4930	5242	5290	6083	6772	5798	4183
CONTRACTOR FEES	1540	1638	1653	1901	2116	1812	1307
CONTINGENCY	8011	8518	8596	9885	11004	11777	8861
ALLOWANCE FOR SHUTDOWN	4627	4908	4988	5931	6569	5653	4050
INTEREST DURING CONSTRUCTION	7998	8504	8582	9869	10986	9407	6787
LAND	504	604	502	86	86	86	791
WORKING CAPITAL	370	309	318	417	551	321	294
TOTAL CAPITAL INVESTMENT	61563	65434	65966	75613	84216	74352	54770

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.164 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: NPCC

PLANT SIZE: 500 MW

COAL: 1.25 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	1887	---	1797	---	---	---	2078
-LIMESTONE	---	979	---	521	---	---	---
-SODA ASH	---	---	124	---	1282	508	---
-MAGNESIUM OXIDE	---	---	---	120	---	---	---
-COAL	---	---	---	---	---	671	---
-CATALYST	---	---	---	2	---	7	---
UTILITIES							
-ELECTRICITY	1471	1658	815	1612	1510	2194	1448
-WATER	26	26	30	138	516	289	9
-STEAM	1086	1074	1086	1116	3503	---	---
-FUEL OIL	---	---	---	1734	---	691	---
-NATURAL GAS	---	---	---	---	332	---	---
-HEAT CREDIT	---	---	---	(94)	(13)	(221)	---
TOTAL VARIABLE O&M COST	4469	3736	3852	5148	7131	4139	3535
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	249
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	328	328	437	628	621	674	328
MAINTENANCE							
-LABOR & MATERIAL	2371	2515	1304	2655	2942	2516	1556
TOTAL FIXED O&M COST	2699	2843	1741	3283	3563	3190	2133
OVERHEAD							
-PLANT	1349	1421	871	1641	1781	1595	1067
-ADMINISTRATIVE	33	33	44	63	62	67	33
-MARKETING	---	---	---	132	77	96	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1318)	---	---	---
-SULFUR	---	---	---	---	(774)	(964)	---
NET OPERATING COST	8550	8034	6507	8950	11840	8124	6768
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL./KWH)	3.34	3.55	3.58	4.10	4.57	4.03	2.97
-LEVELIZED OPERATING COST (MILL./KWH)	3.97	3.73	3.03	4.16	5.50	3.78	3.15
TOTAL LEVELIZED COST (MILL./KWH)	7.31	7.28	6.60	8.26	10.07	7.81	6.12

APPLICATION: RETROFIT

REGION: NPCC

PLANT SIZE: 100 MW

COAL: 1.90 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	301	660	269	143	112	129	339
GAS HANDLING	2100	2087	2113	2301	2338	2499	2436
CHLORIDE PURGE	---	---	---	1429	745	---	---
SO2 ABSORPTION	4066	4287	4033	2391	3672	4196	6644
STACK GAS REHEAT	542	570	570	513	501	---	---
REGENERATION	---	---	53	1442	1622	1571	---
SLUDGE DISPOSAL	632	661	607	---	---	---	132
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	733	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	898	361	---
ESP CREDIT	---	---	---	---	---	---	(3050)
SERVICES, UTILITIES, MISC	458	496	459	537	593	525	390
SLUDGE POND	307	337	303	---	72	---	60
TOTAL DIRECT INVESTMENT	8407	9098	8407	9488	10553	9280	6951
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	757	819	757	854	950	835	626
CONSTRUCTION EXPENSE	1345	1456	1345	1518	1688	1485	1112
CONTRACTOR FEES	420	455	420	474	528	464	348
CONTINGENCY	2186	2366	2186	2467	2744	3016	2440
ALLOWANCE FOR SHAKEDOWN	1281	1386	1281	1480	1639	1448	1078
INTEREST DURING CONSTRUCTION	2182	2362	2182	2463	2739	2409	1804
LAND	96	105	95	86	86	86	183
WORKING CAPITAL	62	55	48	70	185	52	42
TOTAL CAPITAL INVESTMENT	16736	18100	16722	18901	21112	19075	14584

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.166 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/B1

APPLICATION: RETROFIT

REGION: NPCC

PLANT SIZE: 100 MW

COAL: 1.90 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	176	---	167	---	---	---	194
-LIMESTONE	---	91	---	111	---	---	---
-SODA ASH	---	---	12	---	1183	47	---
-MAGNESIUM OXIDE	---	---	---	11	---	---	---
-COAL	---	---	---	---	---	63	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	339	360	167	333	330	468	309
-WATER	5	5	6	20	104	66	2
-STEAM	231	209	232	238	747	---	---
-FUEL OIL	---	---	---	162	---	64	---
-NATURAL GAS	---	---	---	---	-36	---	---
-HEAT CREDIT	---	---	---	(9)	(-1)	(21)	---
TOTAL VARIABLE O&M COST	752	665	584	866	2328	688	504
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	44
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	142	142	200	269	266	289	142
MAINTENANCE							
-LABOR & MATERIAL	805	371	489	838	928	815	542
TOTAL FIXED O&M COST	947	1013	688	1107	1193	1104	728
OVERHEAD							
-PLANT	474	507	344	553	597	552	364
-ADMINISTRATIVE	14	14	20	27	27	29	14
-MARKETING	---	---	---	12	-8	9	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(123)	---	---	---
-SULFUR	---	---	---	---	(-85)	(90)	---
NET OPERATING COST	2187	2199	1637	2442	4221	2293	1611
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.54	4.91	4.53	5.12	5.72	5.17	3.95
-LEVELIZED OPERATING COST (MILL/KWH)	5.08	5.11	3.80	5.68	9.81	5.33	3.74
TOTAL LEVELIZED COST (MILL/KWH)	9.62	10.02	8.34	10.80	15.54	10.50	7.70

TABLE G-1.167 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: NPCC		PLANT SIZE: 100 MW		COAL: 1.25 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	526	1012	477	238	201	232	586
GAS HANDLING	2093	2080	2106	2294	2330	2491	2428
CHLORIDE PURGE	---	---	---	1424	743	---	---
SO2 ABSORPTION	4053	4273	4019	2383	3659	4181	6623
STACK GAS REHEAT	540	568	568	511	500	---	---
REGENERATION	---	---	87	2308	2595	2513	---
SLUDGE DISPOSAL	830	868	973	---	---	---	216
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1291	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1600	643	---
ESP CREDIT	---	---	---	---	---	---	(3041)
SERVICES, UTILITIES, MISC	483	528	494	627	698	604	409
SLUDGE POND	570	632	554	---	72	---	60
TOTAL DIRECT INVESTMENT	9094	9961	9279	11075	12396	10663	7281
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	819	897	835	997	1116	960	655
CONSTRUCTION EXPENSE	1455	1594	1485	1772	1983	1706	1165
CONTRACTOR FEES	455	498	464	554	620	533	364
CONTINGENCY	2365	2590	2413	2879	3223	3465	2468
ALLOWANCE FOR SHAKEDOWN	1362	1491	1392	1728	1927	1663	1130
INTEREST DURING CONSTRUCTION	2361	2586	2409	2875	3218	2768	1890
LAND	149	171	149	86	86	86	210
WORKING CAPITAL	81	65	68	89	192	68	62
TOTAL CAPITAL INVESTMENT	18140	19852	18493	22055	24760	21912	15225

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.168 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: NPCC

PLANT SIZE: 100 MW

COAL: 1.25 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LINE	401	---	382	---	---	---	442
-LIMESTONE	---	208	---	111	---	---	---
-SODA ASH	---	---	26	---	1216	108	---
-MAGNESIUM OXIDE	---	---	---	25	---	---	---
-COAL	---	---	---	---	---	143	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	340	363	173	352	331	466	308
-WATER	5	6	6	30	113	61	2
-STEAM	231	212	231	237	744	---	---
-FUEL OIL	---	---	---	368	---	147	---
-NATURAL GAS	---	---	---	---	11	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(47)	---
TOTAL VARIABLE O&M COST	977	788	818	1104	2415	879	751
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	53
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	127	127	180	240	237	258	127
MAINTENANCE							
-LABOR & MATERIAL	855	936	533	978	1091	936	568
TOTAL FIXED O&M COST	982	1063	713	1218	1328	1195	748
OVERHEAD							
-PLANT	491	531	357	609	664	597	374
-ADMINISTRATIVE	13	13	18	24	24	26	13
-MARKETING	---	---	---	28	3	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(280)	---	---	---
-SULFUR	---	---	---	---	(25)	(205)	---
NET OPERATING COST	2462	2395	1906	2703	4408	2513	1886
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.92	5.38	5.01	5.98	6.71	5.94	4.13
-LEVELIZED OPERATING COST (MILL/KWH)	5.72	5.57	4.43	6.28	10.25	5.84	4.38
TOTAL LEVELIZED COST (MILL/KWH)	10.64	10.95	9.44	12.26	16.96	11.78	8.51

TABLE G-1.169 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SERC

PLANT SIZE: 500 MW

COAL: 3.50 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3945	4876	3816	1462	1594	1835	4247
GAS HANDLING	8581	8585	8415	9169	9312	9954	9959
CHLORIDE PURGE	---	---	---	6571	3427	---	---
SO ₂ ABSORPTION	15305	14142	16732	9894	15156	17319	24892
STACK GAS REHEAT	2218	2201	2201	2067	2036	---	---
REGENERATION	---	---	494	12185	13674	13243	---
SLUDGE DISPOSAL	2179	2276	5175	---	---	---	1242
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9574	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	12316	4951	---
ESP CREDIT	---	---	---	---	---	---	(11114)
SERVICES, UTILITIES, MISC	1934	2045	2210	3055	3451	2838	1754
SLUDGE POND	4804	5525	4393	---	363	---	303
TOTAL DIRECT INVESTMENT	38966	41649	43435	53977	61329	50140	31282
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3507	3748	3909	4858	5520	4513	2815
CONSTRUCTION EXPENSE	6235	6664	6950	8636	9813	8022	5005
CONTRACTOR FEES	1948	2082	2172	2699	3066	2507	1564
CONTINGENCY	10131	10829	11293	14034	15945	16296	11910
ALLOWANCE FOR SHAKEDOWN	5598	5945	6337	8420	9531	7822	4850
INTEREST DURING CONSTRUCTION	10115	10811	11275	14011	15920	13016	8120
LAND	553	671	551	26	26	26	470
WORKING CAPITAL	803	402	765	800	664	678	758
TOTAL CAPITAL INVESTMENT	77856	82802	86685	107461	121814	103020	66774

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.170 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: SERC PLANT SIZE: 500 MW COAL: 3.50 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	6855	---	6528	---	---	---	7549
-LIMESTONE	---	1706	---	482	---	---	---
-SODA ASH	---	---	463	---	1277	1892	---
-MAGNESIUM OXIDE	---	---	---	456	---	---	---
-COAL	---	---	---	---	---	2501	---
-CATALYST	---	---	---	6	---	25	---
UTILITIES							
-ELECTRICITY	1618	1885	1027	2213	1670	2355	1555
-WATER	34	36	35	374	782	389	12
-STEAM	1165	1236	1166	1198	3760	---	---
-FUEL OIL	---	---	---	5613	---	2236	---
-NATURAL GAS	---	---	---	---	1322	---	---
-HEAT CREDIT	---	---	---	(368)	(59)	(865)	---
TOTAL VARIABLE O&M COST	9673	4864	9220	9974	8751	8533	9115
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	505
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	380	380	505	726	718	781	380
MAINTENANCE							
-LABOR & MATERIAL	2872	3050	1692	3769	4268	3481	1863
TOTAL FIXED O&M COST	3252	3430	2196	4495	4986	4262	2748
OVERHEAD							
-PLANT	1626	1715	1098	2248	2493	2131	1374
-ADMINISTRATIVE	38	38	50	73	72	78	38
-MARKETING	---	---	---	517	358	378	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5169)	---	---	---
-SULFUR	---	---	---	---	(3582)	(3780)	---
NET OPERATING COST	14588	10047	12564	12138	13078	11601	13275
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.22	4.49	4.70	5.83	6.61	5.59	3.62
-LEVELIZED OPERATING COST (MILL/KWH)	6.78	4.67	5.84	5.64	6.08	5.39	6.17
TOTAL LEVELIZED COST (MILL/KWH)	11.00	9.16	10.54	11.47	12.68	10.98	9.79

APPLICATION: RETROFIT		REGION: SERC		PLANT SIZE: 500 MW		COAL: 1.20 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1545	2334	1451	632	614	707	1693
GAS HANDLING	8564	8568	8398	9151	9294	9935	9939
CHLORIDE PURGE	---	---	---	6558	3420	---	---
SO2 ABSORPTION	15277	16111	16699	9874	15125	17284	24845
STACK GAS REHEAT	2214	2197	2197	2063	2032	---	---
REGENERATION	---	---	221	3660	6356	6156	---
SLUDGE DISPOSAL	1397	1460	2396	---	---	---	555
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3802	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4807	1933	---
ESP CREDIT	---	---	---	---	---	---	(11096)
SERVICES, UTILITIES, MISC	1740	1840	1882	2264	2499	2161	1556
SLUDGE POND	1822	2060	1720	---	363	---	302
TOTAL DIRECT INVESTMENT	32558	34569	34963	40004	44510	38175	27795
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2930	3111	3147	3600	4006	3436	2502
CONSTRUCTION EXPENSE	5209	5531	5594	6401	7122	6108	4447
CONTRACTOR FEES	1628	1728	1748	2000	2226	1909	1390
CONTINGENCY	8465	8988	9090	10401	11573	12407	9395
ALLOWANCE FOR SHUTDOWN	4897	5187	5282	6241	6907	5955	4306
INTEREST DURING CONSTRUCTION	8452	8974	9076	10384	11554	9910	7215
LAND	156	187	156	26	26	26	250
WORKING CAPITAL	376	281	321	407	572	322	293
TOTAL CAPITAL INVESTMENT	64672	68556	69377	79464	88496	78247	57592

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.172 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: SERC		PLANT SIZE: 500 MW		COAL: 1.20 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME		1788	---	1703	---	---	---	1969
-LIMESTONE		---	445	---	482	---	---	---
-SODA ASH		---	---	121	---	1220	494	---
-MAGNESIUM OXIDE		---	---	---	119	---	---	---
-COAL		---	---	---	---	---	652	---
-CATALYST		---	---	---	2	---	7	---
UTILITIES								
-ELECTRICITY		1569	1771	870	1716	1614	2350	1551
-WATER		27	28	32	144	549	307	9
-STEAM		1163	1153	1164	1196	3752	---	---
-FUEL OIL		---	---	---	1464	---	583	---
-NATURAL GAS		---	---	---	---	294	---	---
-HEAT CREDIT		---	---	---	(96)	(13)	(226)	---
TOTAL VARIABLE O&M COST		4547	3397	3889	5026	7415	4168	3530
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	260
LABOR								
-OPERATING, ANALYSIS, SUPERVISION		327	327	436	626	619	672	327
MAINTENANCE								
-LABOR & MATERIAL		2509	2658	1380	2793	3093	2650	1654
TOTAL FIXED O&M COST		2836	2984	1815	3419	3712	3322	2241
OVERHEAD								
-PLANT		1418	1492	908	1710	1856	1661	1120
-ADMINISTRATIVE		33	33	44	63	62	67	33
-MARKETING		---	---	---	135	80	99	---
BYPRODUCT SALES								
-SULFURIC ACID		---	---	---	(1348)	---	---	---
-SULFUR		---	---	---	---	(797)	(986)	---
NET OPERATING COST		8833	7906	6655	9005	12328	8330	6924
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)		3.51	3.72	3.76	4.31	4.80	4.24	3.12
-LEVELIZED OPERATING COST (MILL/KWH)		4.11	3.68	3.09	4.19	5.73	3.87	3.22
TOTAL LEVELIZED COST (MILL/KWH)		7.61	7.39	6.86	8.50	10.53	8.12	6.34

TABLE G-1.173 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: SERC PLANT SIZE: 100 MW COAL: 3.50 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1341	2090	1253	556	531	611	1473
GAS HANDLING	2238	2224	2249	2449	2488	2660	2596
CHLORIDE PURGE	---	---	---	1522	794	---	---
SO2 ABSORPTION	4317	4553	4300	2549	3914	4472	7054
STACK GAS REHEAT	578	606	606	546	534	---	---
REGENERATION	---	---	196	5034	5655	5476	---
SLUDGE DISPOSAL	1305	1364	2130	---	---	---	490
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3302	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4164	1674	---
ESP CREDIT	---	---	---	---	---	---	(3219)
SERVICES, UTILITIES, MISC	587	650	644	958	1085	894	504
SLUDGE POND	1568	1768	1486	---	77	---	64
TOTAL DIRECT INVESTMENT	11934	13254	12865	16917	19241	15787	8963
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1074	1193	1158	1522	1732	1421	807
CONSTRUCTION EXPENSE	1909	2121	2058	2707	3079	2526	1434
CONTRACTOR FEES	597	663	643	846	962	789	448
CONTINGENCY	3103	3446	3345	4398	5003	5131	3412
ALLOWANCE FOR SHAKEDOWN	1705	1891	1858	2639	2994	2463	1392
INTEREST DURING CONSTRUCTION	3098	3441	3339	4391	4995	4098	2327
LAND	130	155	130	26	26	26	113
WORKING CAPITAL	173	85	163	171	216	144	161
TOTAL CAPITAL INVESTMENT	23722	26249	25559	33617	38247	32385	19056

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.174 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT REGION: SERC PLANT SIZE: 100 MW COAL: 3.50 % SULFUR							
OPERATING COST	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
(VARIABLE)							
RAW MATERIAL							
-LIME	1456	---	1387	---	---	---	1604
-LIMESTONE	---	363	---	103	---	---	---
-SODA ASH	---	---	98	---	1211	402	---
-MAGNESIUM OXIDE	---	---	---	97	---	---	---
-COAL	---	---	---	---	---	531	---
-CATALYST	---	---	---	1	---	5	---
UTILITIES							
-ELECTRICITY	373	412	218	480	365	500	330
-WATER	7	8	7	80	170	83	3
-STEAM	248	245	248	255	799	---	---
-FUEL OIL	---	---	---	1192	---	475	---
-NATURAL GAS	---	---	---	---	227	---	---
-HEAT CREDIT	---	---	---	(78)	(10)	(184)	---
TOTAL VARIABLE O&M COST	2084	1027	1959	2130	2762	1813	1936
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	107
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	179	179	248	338	335	365	179
MAINTENANCE							
-LABOR & MATERIAL	1066	1182	718	1494	1695	1386	700
TOTAL FIXED O&M COST	1245	1361	966	1832	2029	1752	986
OVERHEAD							
-PLANT	622	580	483	916	1015	876	493
-ADMINISTRATIVE	18	18	25	34	33	37	18
-MARKETING	---	---	---	110	62	80	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1098)	---	---	---
-SULFUR	---	---	---	---	(615)	(803)	---
NET OPERATING COST	3969	3086	3432	3924	5286	3754	3433
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	6.43	7.12	6.93	9.11	10.37	8.78	5.17
-LEVELIZED OPERATING COST (MILL/KWH)	9.23	7.17	7.98	9.12	12.29	8.73	7.98
TOTAL LEVELIZED COST (MILL/KWH)	15.66	14.29	14.91	18.24	22.66	17.51	13.15

TABLE G-1.175 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: SERC		PLANT SIZE: 100 MW		COAL: 1.20 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	534	1024	485	242	204	235	595
GAS HANDLING	2233	2220	2245	2445	2483	2655	2591
CHLORIDE PURGE	---	---	---	1519	792	---	---
SO2 ABSORPTION	4309	4544	4292	2544	3906	4463	7041
STACK GAS REHEAT	577	605	605	545	533	---	---
REGENERATION	---	---	88	2338	2629	2546	---
SLUDGE DISPOSAL	836	875	986	---	---	---	219
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1312	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1625	653	---
ESP CREDIT	---	---	---	---	---	---	(3213)
SERVICES, UTILITIES, MISC	509	556	522	657	730	633	434
SLUDGE POND	580	643	564	---	77	---	64
TOTAL DIRECT INVESTMENT	9579	10466	9786	11600	12980	11186	7731
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	862	942	881	1044	1168	1007	698
CONSTRUCTION EXPENSE	1533	1675	1566	1856	2077	1790	1237
CONTRACTOR FEES	479	523	489	580	649	559	387
CONTINGENCY	2490	2721	2544	3016	3375	3635	2613
ALLOWANCE FOR SHAKEDOWN	1436	1568	1470	1810	2017	1745	1200
INTEREST DURING CONSTRUCTION	2486	2717	2540	3011	3370	2904	2007
LAND	46	53	46	26	26	26	66
WORKING CAPITAL	82	59	68	87	193	68	62
TOTAL CAPITAL INVESTMENT	18994	20725	19390	23031	25855	22920	15998

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.176 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SERC

PLANT SIZE: 100 MW

COAL: 1.20 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	380	---	362	---	---	---	418
-LIMESTONE	---	95	---	103	---	---	---
-SODA ASH	---	---	26	---	1157	105	---
-MAGNESIUM OXIDE	---	---	---	25	---	---	---
-COAL	---	---	---	---	---	139	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	363	388	185	375	354	499	330
-WATER	6	6	7	31	120	65	2
-STEAM	247	227	247	254	797	---	---
-FUEL OIL	---	---	---	311	---	124	---
-NATURAL GAS	---	---	---	---	11	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(48)	---
TOTAL VARIABLE O&M COST	995	715	826	1079	2438	885	750
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	55
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	126	126	179	238	235	256	126
MAINTENANCE							
-LABOR & MATERIAL	902	985	563	1025	1142	982	603
TOTAL FIXED O&M COST	1027	1110	741	1263	1377	1238	784
OVERHEAD							
-PLANT	514	555	371	631	689	619	392
-ADMINISTRATIVE	13	13	18	24	24	26	13
-MARKETING	---	---	---	29	3	21	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(286)	---	---	---
-SULFUR	---	---	---	---	(30)	(209)	---
NET OPERATING COST	2549	2394	1956	2738	4501	2580	1939
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.15	5.62	5.26	6.24	7.01	6.21	4.34
-LEVELIZED OPERATING COST (MILL/KWH)	5.93	5.56	4.55	6.37	10.46	6.00	4.51
TOTAL LEVELIZED COST (MILL/KWH)	11.07	11.18	9.80	12.61	17.47	12.21	8.84

TABLE G-1.177 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: RPP-1 PLANT SIZE: 500 MW COAL: 2.75 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3948	4879	3819	1463	1596	1837	4251
GAS HANDLING	9896	9906	9680	10548	10713	11452	11485
CHLORIDE PURGE	---	---	---	7578	3952	---	---
SO2 ABSORPTION	17315	18472	19322	11423	17493	19990	28472
STACK GAS REHEAT	2558	2524	2524	2381	2346	---	---
REGENERATION	---	---	494	12194	13683	13252	---
SLUDGE DISPOSAL	2180	2277	5178	---	---	---	1243
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9582	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	12326	4955	---
ESP CREDIT	---	---	---	---	---	---	(12541)
SERVICES, UTILITIES, MISC	2166	2283	2461	3310	3727	3089	1975
SLUDGE POND	4808	5530	4397	---	423	---	352
TOTAL DIRECT INVESTMENT	43070	45872	47876	58478	66259	54575	35236
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3876	4128	4309	5263	5963	4912	3171
CONSTRUCTION EXPENSE	6891	7340	7660	9356	10602	8732	5638
CONTRACTOR FEES	2154	2294	2394	2924	3313	2729	1762
CONTINGENCY	11198	11927	12448	15204	17227	17737	12924
ALLOWANCE FOR SHAKEDOWN	6238	6603	7029	9123	10294	8514	5462
INTEREST DURING CONSTRUCTION	11180	11908	12428	15180	17200	14167	9147
LAND	346	421	345	16	16	16	332
WORKING CAPITAL	794	566	746	965	721	648	730
TOTAL CAPITAL INVESTMENT	85748	91057	95234	116510	131596	112029	74402

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.178 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: SPP-1		PLANT SIZE: 500 MW		COAL: 2.75 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	6315	---	6014	---	---	---	6953
-LIMESTONE	---	3203	---	444	---	---	---
-SODA ASH	---	---	425	---	1172	1739	---
-MAGNESIUM OXIDE	---	---	---	416	---	---	---
-COAL	---	---	---	---	---	1269	---
-CATALYST	---	---	---	6	---	13	---
UTILITIES							
-ELECTRICITY	1856	2162	1161	2460	1925	2739	1808
-WATER	38	40	40	385	857	421	13
-STEAM	1355	1430	1356	1394	4372	---	---
-FUEL OIL	---	---	---	7237	---	2883	---
-NATURAL GAS	---	---	---	---	1244	---	---
-HEAT CREDIT	---	---	---	(369)	(39)	(866)	---
TOTAL VARIABLE O&M COST	9565	6836	8996	11973	9511	8198	8774
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	574
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	363	363	482	694	686	746	363
MAINTENANCE							
-LABOR & MATERIAL	3199	3387	1869	4083	4610	3789	2098
TOTAL FIXED O&M COST	3562	3750	2351	4777	5295	4534	3034
OVERHEAD							
-PLANT	1781	1875	1176	2388	2648	2267	1517
-ADMINISTRATIVE	36	36	48	69	69	75	36
-MARKETING	---	---	---	518	359	379	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5175)	---	---	---
-SULFUR	---	---	---	---	(3587)	(3785)	---
NET OPERATING COST	14944	12496	12571	14550	14295	11667	13362
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.65	4.94	5.16	6.32	7.14	6.07	4.03
-LEVELIZED OPERATING COST (MILL/KWH)	6.95	5.81	5.84	6.76	6.65	5.42	6.21
TOTAL LEVELIZED COST (MILL/KWH)	11.60	10.75	11.01	13.08	13.78	11.50	10.25

TABLE G-1.179 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: SPP-1 PLANT SIZE: 500 MW COAL: 0.80 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1402	2163	1312	579	556	640	1539
GAS HANDLING	10160	10171	9935	10825	10994	11752	11791
CHLORIDE PURGE	---	---	---	7780	4058	---	---
SO2 ABSORPTION	17957	18939	19843	11730	17964	20528	29188
STACK GAS REHEAT	2626	2589	2589	2444	2409	---	---
REGENERATION	---	---	203	3222	5866	5681	---
SLUDGE DISPOSAL	1333	1393	2210	---	---	---	510
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3451	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4356	1751	---
ESP CREDIT	---	---	---	---	---	---	(12825)
SERVICES, UTILITIES, MISC	2009	2115	2166	2522	2772	2421	1812
SLUDGE POND	1644	1855	1556	---	435	---	362
TOTAL DIRECT INVESTMENT	37130	39226	39814	44554	49408	42772	32378
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3342	3530	3583	4010	4447	3850	2914
CONSTRUCTION EXPENSE	5941	6276	6370	7129	7905	6844	5180
CONTRACTOR FEES	1857	1961	1991	2228	2470	2139	1619
CONTINGENCY	9654	10199	10352	11584	12846	13901	10703
ALLOWANCE FOR SHAKEDOWN	5628	5934	6055	6950	7664	6672	5015
INTEREST DURING CONSTRUCTION	9638	10182	10335	11566	12825	11103	8405
LAND	86	103	86	16	16	16	176
WORKING CAPITAL	390	351	323	460	646	330	286
TOTAL CAPITAL INVESTMENT	73665	77762	78908	88497	98228	87626	66676

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.180 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SPP-1

PLANT SIZE: 500 MW

COAL: 0.80 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1429	---	1361	---	---	---	1573
-LIMESTONE	---	725	---	444	---	---	---
-SODA ASH	---	---	96	---	1114	394	---
-MAGNESIUM OXIDE	---	---	---	94	---	---	---
-COAL	---	---	---	---	---	287	---
-CATALYST	---	---	---	1	---	3	---
UTILITIES							
-ELECTRICITY	1857	2103	1025	1992	1922	2817	1859
-WATER	32	32	37	145	628	352	11
-STEAM	1393	1385	1395	1433	4496	---	---
-FUEL OIL	---	---	---	1638	---	652	---
-NATURAL GAS	---	---	---	---	232	---	---
-HEAT CREDIT	---	---	---	(83)	(11)	(196)	---
TOTAL VARIABLE O&M COST	4711	4244	3914	5664	8381	4308	3443
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	295
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	317	317	424	609	602	653	317
MAINTENANCE							
-LABOR & MATERIAL	2883	3040	1575	3111	3432	2949	1927
TOTAL FIXED O&M COST	3200	3357	1999	3720	4034	3622	2539
OVERHEAD							
-PLANT	1600	1679	999	1860	2017	1811	1269
-ADMINISTRATIVE	32	32	42	61	60	65	32
-MARKETING	---	---	---	117	67	86	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1171)	---	---	---
-SULFUR	---	---	---	---	(668)	(856)	---
NET OPERATING COST	9543	9312	6954	10251	13891	9036	7283
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL./KWH)	3.99	4.22	4.28	4.80	5.33	4.75	3.62
-LEVELIZED OPERATING COST (MILL./KWH)	4.44	4.33	3.23	4.77	6.46	4.20	3.39
TOTAL LEVELIZED COST (MILL./KWH)	8.43	8.55	7.51	9.56	11.78	8.95	7.00

TABLE G-1.181 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SPP-1

PLANT SIZE: 100 MW

COAL: 2.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1342	2091	1254	557	531	612	1474
GAS HANDLING	2580	2564	2587	2818	2862	3060	2993
CHLORIDE PURGE	---	---	---	1755	916	---	---
SO2 ABSORPTION	4941	5210	4966	2943	4517	5162	8069
STACK GAS REHEAT	666	695	695	629	615	---	---
REGENERATION	---	---	196	5038	5659	5480	---
SLUDGE DISPOSAL	1306	1364	2131	---	---	---	491
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3305	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4168	1675	---
ESP CREDIT	---	---	---	---	---	---	(3632)
SERVICES, UTILITIES, MISC	650	716	710	1023	1156	959	564
SLUDGE POND	1570	1769	1488	---	90	---	75
TOTAL DIRECT INVESTMENT	13055	14412	14027	18067	20514	16949	10034
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1175	1297	1262	1626	1846	1525	903
CONSTRUCTION EXPENSE	2089	2306	2244	2891	3282	2712	1605
CONTRACTOR FEES	653	721	701	903	1026	847	502
CONTINGENCY	3394	3747	3647	4697	5334	5508	3680
ALLOWANCE FOR SHUTDOWN	1880	2071	2039	2818	3191	2644	1558
INTEREST DURING CONSTRUCTION	3389	3741	3641	4690	5325	4400	2605
LAND	82	97	81	16	16	16	79
WORKING CAPITAL	171	120	158	206	222	138	155
TOTAL CAPITAL INVESTMENT	25886	28512	27803	35915	40757	34739	21121

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.182 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: SPP-1 PLANT SIZE: 100 MW COAL: 2.75 % SULFUR							
OPERATING COST	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
(VARIABLE)							
RAW MATERIAL							
-LIME	1341	---	1278	---	---	---	1477
-LIMESTONE	---	681	---	94	---	---	---
-SODA ASH	---	---	90	---	1112	369	---
-MAGNESIUM OXIDE	---	---	---	88	---	---	---
-COAL	---	---	---	---	---	270	---
-CATALYST	---	---	---	1	---	3	---
UTILITIES							
-ELECTRICITY	428	473	247	535	421	582	384
-WATER	8	9	8	82	186	90	3
-STEAM	288	283	288	296	929	---	---
-FUEL OIL	---	---	---	1537	---	612	---
-NATURAL GAS	---	---	---	---	214	---	---
-HEAT CREDIT	---	---	---	(78)	(10)	(184)	---
TOTAL VARIABLE O&M COST	2066	1445	1911	2556	2851	1742	1864
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	122
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	162	162	225	306	302	330	162
MAINTENANCE							
-LABOR & MATERIAL	1176	1295	787	1596	1807	1488	783
TOTAL FIXED O&M COST	1337	1457	1012	1901	2109	1818	1067
OVERHEAD							
-PLANT	669	729	506	951	1054	909	533
-ADMINISTRATIVE	16	16	23	31	30	33	16
-MARKETING	---	---	---	110	62	80	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1099)	---	---	---
-SULFUR	---	---	---	---	(616)	(804)	---
NET OPERATING COST	4088	3647	3452	4449	5490	3778	3480
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	7.02	7.73	7.54	9.74	11.05	9.42	5.73
-LEVELIZED OPERATING COST (MILL/KWH)	9.50	8.48	8.02	10.34	12.76	8.78	8.09
TOTAL LEVELIZED COST (MILL/KWH)	16.52	16.21	15.56	20.08	23.81	18.20	13.82

TABLE G-1.183 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: SPP-1

PLANT SIZE: 100 MW

COAL: 0.80 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	485	952	439	221	185	213	542
GAS HANDLING	2649	2635	2655	2892	2938	3140	3073
CHLORIDE PURGE	---	---	---	1802	940	---	---
SO2 ABSORPTION	5065	5341	5100	3022	4639	5301	8272
STACK GAS REHEAT	684	713	713	645	632	---	---
REGENERATION	---	---	81	2158	2426	2349	---
SLUDGE DISPOSAL	798	835	910	---	---	---	201
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1191	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1473	592	---
ESP CREDIT	---	---	---	---	---	---	(3714)
SERVICES, UTILITIES, MISC	581	629	594	716	794	696	502
SLUDGE POND	522	578	509	---	92	---	77
TOTAL DIRECT INVESTMENT	10785	11682	11000	12647	14118	12291	8954
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	971	1051	990	1138	1271	1106	806
CONSTRUCTION EXPENSE	1726	1869	1760	2024	2259	1967	1433
CONTRACTOR FEES	539	584	550	632	706	615	448
CONTINGENCY	2804	3037	2860	3288	3671	3995	2960
ALLOWANCE FOR SHAKEDOWN	1630	1765	1665	1973	2193	1917	1389
INTEREST DURING CONSTRUCTION	2800	3033	2855	3283	3665	3191	2324
LAND	26	30	26	16	16	16	45
WORKING CAPITAL	86	74	69	99	203	70	61
TOTAL CAPITAL INVESTMENT	21367	23125	21776	25100	28101	25167	18419

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.184 . ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SPP-1

PLANT SIZE: 100 MW

COAL: 0.80 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	304	---	289	---	---	---	334
-LIMESTONE	---	154	---	94	---	---	---
-SODA ASH	---	---	20	---	1057	84	---
-MAGNESIUM OXIDE	---	---	---	20	---	---	---
-COAL	---	---	---	---	---	61	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	429	461	218	436	421	598	395
-WATER	7	7	8	31	138	75	2
-STEAM	296	273	296	304	955	---	---
-FUEL OIL	---	---	---	348	---	139	---
-NATURAL GAS	---	---	---	---	1	---	---
-HEAT CREDIT	---	---	---	(18)	(0)	(42)	---
TOTAL VARIABLE O&M COST	1036	894	831	1216	2572	915	731
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	63
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	117	117	167	221	218	237	117
MAINTENANCE							
-LABOR & MATERIAL	1024	1109	636	1117	1241	1079	698
TOTAL FIXED O&M COST	1141	1225	803	1338	1460	1316	878
OVERHEAD							
-PLANT	570	613	401	669	730	658	439
-ADMINISTRATIVE	12	12	17	22	22	24	12
-MARKETING	---	---	---	25	0	18	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(249)	---	---	---
-SULFUR	---	---	---	---	(3)	(182)	---
NET OPERATING COST	2758	2743	2052	3021	4780	2750	2059
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.79	6.27	5.90	6.81	7.62	6.82	4.99
-LEVELIZED OPERATING COST (MILL/KWH)	6.41	6.38	4.77	7.02	11.11	6.39	4.79
TOTAL LEVELIZED COST (MILL/KWH)	12.20	12.65	10.67	13.83	18.73	13.21	9.78

APPLICATION: RETROFIT

REGION: SPP-2

PLANT SIZE: 500 MW

COAL: 3.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	3956	4886	3826	1466	1599	1840	4259
GAS HANDLING	8110	8111	7961	8674	8809	9417	9412
CHLORIDE PURGE	---	---	---	6210	3239	---	---
SO2 ABSORPTION	14509	15302	15805	9346	14318	16362	23601
STACK GAS REHEAT	2096	2084	2084	1955	1925	---	---
REGENERATION	---	---	495	12212	13704	13272	---
SLUDGE DISPOSAL	2182	2279	5186	---	---	---	1245
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	9599	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	12349	4965	---
ESP CREDIT	---	---	---	---	---	---	(10595)
SERVICES, UTILITIES, MISC	1851	1960	2121	2968	3357	2751	1675
SLUDGE POND	4817	5541	4405	---	342	---	285
TOTAL DIRECT INVESTMENT	37521	40163	41883	52429	59642	48607	29882
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3377	3615	3769	4719	5368	4375	2689
CONSTRUCTION EXPENSE	6003	6426	6701	8389	9543	7777	4781
CONTRACTOR FEES	1876	2008	2094	2621	2982	2430	1494
CONTINGENCY	9756	10442	10890	13632	15507	15797	11515
ALLOWANCE FOR SHAKEDOWN	5372	5711	6093	8179	9270	7583	4633
INTEREST DURING CONSTRUCTION	9740	10426	10872	13610	15482	12618	7757
LAND	770	934	766	36	36	36	616
WORKING CAPITAL	800	496	763	759	640	613	762
TOTAL CAPITAL INVESTMENT	75214	80222	83832	104374	118470	99835	64130

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.186 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SPP-2

PLANT SIZE: 500 MW

COAL: 3.75 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	6974	---	6641	---	---	---	7679
-LIMESTONE	---	2998	---	489	---	---	---
-SODA ASH	---	---	440	---	1210	1801	---
-MAGNESIUM OXIDE	---	---	---	437	---	---	---
-COAL	---	---	---	---	---	2075	---
-CATALYST	---	---	---	6	---	21	---
UTILITIES							
-ELECTRICITY	1532	1787	981	2128	1579	2218	1464
-WATER	33	35	33	372	757	374	11
-STEAM	1098	1168	1098	1129	3541	---	---
-FUEL OIL	---	---	---	5293	---	2109	---
-NATURAL GAS	---	---	---	---	1413	---	---
-HEAT CREDIT	---	---	---	(370)	(60)	(869)	---
TOTAL VARIABLE O&M COST	9637	5987	9194	9484	8441	7729	9155
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	477
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	386	386	512	737	729	793	386
MAINTENANCE							
-LABOR & MATERIAL	2756	2931	1629	3661	4151	3374	1780
TOTAL FIXED O&M COST	3142	3316	2142	4398	4880	4167	2642
OVERHEAD							
-PLANT	1571	1658	1071	2199	2440	2084	1321
-ADMINISTRATIVE	39	39	51	74	73	79	39
-MARKETING	---	---	---	519	360	380	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(5189)	---	---	---
-SULFUR	---	---	---	---	(3597)	(3795)	---
NET OPERATING COST	14388	11001	12458	11485	12596	10644	13157
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.08	4.35	4.55	5.66	6.42	5.41	3.48
-LEVELIZED OPERATING COST (MILL/KWH)	6.69	5.11	5.79	5.34	5.86	4.95	6.12
TOTAL LEVELIZED COST (MILL/KWH)	10.77	9.46	10.34	11.00	12.28	10.36	9.59

TABLE G-1.187 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: SPP-2 PLANT SIZE: 500 MW COAL: 1.05 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1516	2300	1423	621	602	693	1662
GAS HANDLING	8991	8996	8810	9599	9749	10421	10434
CHLORIDE PURGE	---	---	---	6885	3591	---	---
SO ₂ ABSORPTION	15996	16870	17539	10370	15884	18151	26011
STACK GAS REHEAT	2324	2302	2302	2165	2133	---	---
REGENERATION	---	---	218	5572	6258	6061	---
SLUDGE DISPOSAL	1384	1447	2359	---	---	---	546
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3732	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4717	1896	---
ESP CREDIT	---	---	---	---	---	---	(11562)
SERVICES, UTILITIES, MISC	1813	1915	1959	2337	2576	2233	1625
SLUDGE POND	1787	2018	1687	---	382	---	318
TOTAL DIRECT INVESTMENT	33810	35848	36295	41281	45892	39457	29034
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3043	3226	3267	3715	4130	3551	2613
CONSTRUCTION EXPENSE	5410	5736	5807	6605	7343	6313	4645
CONTRACTOR FEES	1691	1792	1815	2064	2295	1973	1452
CONTINGENCY	8791	9320	9437	10733	11932	12823	9733
ALLOWANCE FOR SHAKEDOWN	5096	5390	5493	6440	7121	6155	4498
INTEREST DURING CONSTRUCTION	8777	9306	9422	10716	11913	10242	7537
LAND	211	253	211	36	36	36	266
WORKING CAPITAL	386	319	327	408	591	314	298
TOTAL CAPITAL INVESTMENT	67214	71191	72074	81999	91251	80865	60076

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.188 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: SPP-2		PLANT SIZE: 500 MW		COAL: 1.05 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST		-----	-----	-----	-----	-----	-----	-----
(VARIABLE)								
RAW MATERIAL								
-LIME	1763	---	1679	---	---	---	---	1942
-LIMESTONE	---	758	---	489	---	---	---	---
-SODA ASH	---	---	111	---	1155	455	---	---
-MAGNESIUM OXIDE	---	---	---	111	---	---	---	---
-COAL	---	---	---	---	---	525	---	---
-CATALYST	---	---	---	2	---	5	---	---
UTILITIES								
-ELECTRICITY	1646	1860	912	1791	1697	2475	1633	
-WATER	29	29	33	145	571	318	10	
-STEAM	1224	1215	1225	1259	3950	---	---	
-FUEL OIL	---	---	---	1338	---	533	---	
-NATURAL GAS	---	---	---	---	303	---	---	
-HEAT CREDIT	---	---	---	(93)	(13)	(220)	---	
TOTAL VARIABLE O&M COST		4662	3862	3961	5041	7662	4091	3585
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	196
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	323	323	431	620	612	665	323	
MAINTENANCE								
-LABOR & MATERIAL	2611	2762	1433	2882	3189	2739	1728	
TOTAL FIXED O&M COST		2934	3085	1864	3502	3801	3404	2247
OVERHEAD								
-PLANT	1467	1542	932	1751	1901	1702	1124	
-ADMINISTRATIVE	32	32	43	62	61	66	32	
-MARKETING	---	---	---	131	77	96	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(1312)	---	---	---	
-SULFUR	---	---	---	---	(770)	(960)	---	
NET OPERATING COST		9095	8522	6800	9175	12732	8400	6988
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	3.64	3.86	3.91	4.45	4.95	4.38	3.26	
-LEVELIZED OPERATING COST (MILL/KWH)	4.23	3.96	3.16	4.27	5.92	3.91	3.25	
TOTAL LEVELIZED COST (MILL/KWH)		7.87	7.82	7.07	8.71	10.87	8.29	6.51

TABLE G-1.189 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SPP-2

PLANT SIZE: 100 MW

COAL: 3.75 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1344	2094	1257	558	532	613	1477
GAS HANDLING	2115	2102	2128	2317	2354	2516	2453
CHLORIDE PURGE	---	---	---	1439	750	---	---
SO2 ABSORPTION	4093	4316	4062	2408	3498	4225	6688
STACK GAS REHEAT	546	574	574	516	505	---	---
REGENERATION	---	---	196	5046	5667	5489	---
SLUDGE DISPOSAL	1307	1366	2135	---	---	---	491
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3311	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4175	1679	---
ESP CREDIT	---	---	---	---	---	---	(3068)
SERVICES, UTILITIES, MISC	564	627	621	936	1061	871	483
SLUDGE POND	1573	1773	1491	---	73	---	61
TOTAL DIRECT INVESTMENT	11542	12851	12463	16529	18815	15393	8585
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	1039	1157	1122	1488	1693	1385	773
CONSTRUCTION EXPENSE	1847	2056	1994	2645	3010	2463	1374
CONTRACTOR FEES	577	643	623	826	941	770	429
CONTINGENCY	3001	3341	3240	4298	4892	5003	3308
ALLOWANCE FOR SHAKEDOWN	1643	1827	1795	2579	2928	2401	1333
INTEREST DURING CONSTRUCTION	2996	3336	3235	4291	4884	3996	2229
LAND	181	216	181	36	36	36	149
WORKING CAPITAL	172	105	162	162	206	130	162
TOTAL CAPITAL INVESTMENT	22998	25532	24815	32854	37406	31576	18341

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.190 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SPP-2

PLANT SIZE: 100 MW

COAL: 3.75 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1482	---	1411	---	---	---	1631
-LIMESTONE	---	637	---	104	---	---	---
-SODA ASH	---	---	94	---	1148	383	---
-MAGNESIUM OXIDE	---	---	---	93	---	---	---
-COAL	---	---	---	---	---	441	---
-CATALYST	---	---	---	1	---	4	---
UTILITIES							
-ELECTRICITY	353	391	208	462	346	471	311
-WATER	7	7	7	79	164	79	2
-STEAM	233	233	233	240	752	---	---
-FUEL OIL	---	---	---	1124	---	448	---
-NATURAL GAS	---	---	---	---	243	---	---
-HEAT CREDIT	---	---	---	(79)	(10)	(185)	---
TOTAL VARIABLE O&M COST	2075	1266	1953	2025	2642	1642	1945
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	101
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	185	185	255	349	345	377	185
MAINTENANCE							
-LABOR & MATERIAL	1027	1142	694	1460	1657	1352	670
TOTAL FIXED O&M COST	1212	1327	949	1809	2003	1729	956
OVERHEAD							
-PLANT	606	663	475	905	1001	864	478
-ADMINISTRATIVE	18	18	26	35	35	38	18
-MARKETING	---	---	---	110	62	81	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1102)	---	---	---
-SULFUR	---	---	---	---	(618)	(806)	---
NET OPERATING COST	3911	3274	3403	3781	5125	3547	3398
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	6.24	6.92	6.73	8.91	10.14	8.56	4.97
-LEVELIZED OPERATING COST (MILL/KWH)	9.09	7.61	7.91	8.79	11.91	8.25	7.90
TOTAL LEVELIZED COST (MILL/KWH)	15.33	14.53	14.64	17.70	22.05	16.81	12.87

TABLE G-1.191 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT	REGION: SPP-2		PLANT SIZE: 100 MW		COAL: 1.05 % SULFUR		
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	524	1010	476	238	201	231	585
GAS HANDLING	2345	2331	2355	2564	2605	2784	2720
CHLORIDE PURGE	---	---	---	1595	832	---	---
SO2 ABSORPTION	4512	4758	4508	2671	4102	4687	7371
STACK GAS REHEAT	605	634	634	572	559	---	---
REGENERATION	---	---	86	2302	2588	2507	---
SLUDGE DISPOSAL	829	867	971	---	---	---	215
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1287	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1595	641	---
ESP. CREDIT	---	---	---	---	---	---	(3348)
SERVICES, UTILITIES, MISC	529	576	542	674	749	651	453
SLUDGE POND	568	630	553	---	81	---	68
TOTAL DIRECT INVESTMENT	9912	10805	10123	11903	13311	11501	8063
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	892	972	911	1071	1198	1035	726
CONSTRUCTION EXPENSE	1586	1729	1620	1905	2130	1840	1290
CONTRACTOR FEES	496	540	506	595	666	575	403
CONTINGENCY	2577	2809	2632	3095	3461	3738	2703
ALLOWANCE FOR SHUTDOWN	1490	1623	1524	1857	2068	1794	1251
INTEREST DURING CONSTRUCTION	2573	2805	2628	3090	3455	2986	2093
LAND	63	72	63	36	36	36	74
WORKING CAPITAL	85	67	70	88	193	67	63
TOTAL CAPITAL INVESTMENT	19673	21422	20076	23640	26519	23572	16666

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.192 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: SPP-2

PLANT SIZE: 100 MW

COAL: 1.05 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	375	---	357	---	---	---	412
-LIMESTONE	---	161	---	104	---	---	---
-SODA ASH	---	---	24	---	1096	97	---
-MAGNESIUM OXIDE	---	---	---	23	---	---	---
-COAL	---	---	---	---	---	111	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	380	407	194	391	372	526	347
-WATER	6	6	7	31	125	68	2
-STEAM	260	239	260	267	839	---	---
-FUEL OIL	---	---	---	284	---	113	---
-NATURAL GAS	---	---	---	---	10	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(47)	---
TOTAL VARIABLE O&M COST	1021	814	841	1082	2440	869	762
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	42
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	122	122	174	231	229	249	122
MAINTENANCE							
-LABOR & MATERIAL	935	1019	583	1051	1171	1010	629
TOTAL FIXED O&M COST	1058	1141	757	1283	1400	1259	793
OVERHEAD							
-PLANT	529	571	379	641	700	629	396
-ADMINISTRATIVE	12	12	17	23	23	25	12
-MARKETING	---	---	---	28	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(279)	---	---	---
-SULFUR	---	---	---	---	(24)	(204)	---
NET OPERATING COST	2620	2538	1995	2779	4541	2599	1963
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.33	5.81	5.44	6.41	7.19	6.39	4.52
-LEVELIZED OPERATING COST (MILL/KWH)	6.09	5.90	4.64	6.46	10.56	6.04	4.56
TOTAL LEVELIZED COST (MILL/KWH)	11.42	11.71	10.08	12.87	17.74	12.43	9.08

TABLE G-1.193 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-1

PLANT SIZE: 500 MW

COAL: 1.25 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	862	1483	794	373	336	387	954
GAS HANDLING	9590	9599	9387	10228	10388	11104	11130
CHLORIDE PURGE	---	---	---	7344	3830	---	---
SO2 ABSORPTION	17003	17932	18720	11067	16950	19369	27642
STACK GAS REHEAT	2479	2449	2449	2308	2274	---	---
REGENERATION	---	---	133	3490	3922	3798	---
SLUDGE DISPOSAL	1055	1103	1474	---	---	---	334
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2124	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2657	1068	---
ESP CREDIT	---	---	---	---	---	---	(12212)
SERVICES, UTILITIES, MISC	1859	1954	1977	2216	2421	2144	1671
SLUDGE POND	977	1093	938	---	409	---	341
TOTAL DIRECT INVESTMENT	33825	35612	35873	39150	43186	37870	29859
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3044	3205	3229	3524	3887	3408	2687
CONSTRUCTION EXPENSE	5412	5498	5740	6264	6910	6059	4777
CONTRACTOR FEES	1691	1781	1794	1958	2159	1893	1493
CONTINGENCY	8794	9259	9327	10179	11228	12308	10120
ALLOWANCE FOR SHAKEDOWN	5179	5446	5502	6107	6696	5908	4624
INTEREST DURING CONSTRUCTION	8780	9244	9312	10163	11210	9830	7751
LAND	128	150	128	44	44	44	429
WORKING CAPITAL	330	339	263	390	591	268	229
TOTAL CAPITAL INVESTMENT	67185	70734	71167	77778	85912	77588	61970

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.194 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: WSCC-1 PLANT SIZE: 500 MW COAL: 1.25 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	909	---	866	---	---	---	1001
-LIMESTONE	---	811	---	572	---	---	---
-SODA ASH	---	---	42	---	973	174	---
-MAGNESIUM OXIDE	---	---	---	40	---	---	---
-COAL	---	---	---	---	---	116	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	1746	1965	943	1809	1803	2650	1749
-WATER	29	29	35	105	560	349	11
-STEAM	1311	1288	1312	1348	4230	---	---
-FUEL OIL	---	---	---	951	---	379	---
-NATURAL GAS	---	---	---	---	90	---	---
-HEAT CREDIT	---	---	---	(41)	(4)	(97)	---
TOTAL VARIABLE O&M COST	3995	4093	3198	4785	7651	3570	2761
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	266
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	328	328	437	628	621	674	328
MAINTENANCE							
-LABOR & MATERIAL	2652	2789	1424	2734	2999	2629	1777
TOTAL FIXED O&M COST	2980	3117	1861	3362	3620	3303	2371
OVERHEAD							
-PLANT	1490	1558	930	1681	1810	1652	1185
-ADMINISTRATIVE	33	33	44	63	62	67	33
-MARKETING	---	---	---	58	24	42	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(578)	---	---	---
-SULFUR	---	---	---	---	(239)	(423)	---
NET OPERATING COST	8498	8801	6033	9370	12928	8212	6350
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.64	3.84	3.86	4.22	4.66	4.21	3.36
-LEVELIZED OPERATING COST (MILL/KWH)	3.95	4.09	2.80	4.36	6.01	3.82	2.95
TOTAL LEVELIZED COST (MILL/KWH)	7.59	7.93	6.66	8.57	10.67	8.02	6.31

TABLE D-1.195 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: WSCC-1 PLANT SIZE: 500 MW COAL: 0.95 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1519	2303	1425	622	603	695	1665
GAS HANDLING	9694	9703	9487	10337	10498	11222	11251
CHLORIDE PURGE	---	---	---	7423	3871	---	---
SO2 ABSORPTION	17177	18116	18925	11188	17135	19580	27925
STACK GAS REHEAT	2506	2475	2475	2333	2299	---	---
REGENERATION	---	---	218	5581	6268	6070	---
SLUDGE DISPOSAL	1385	1448	2362	---	---	---	546
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3738	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4725	1900	---
ESP CREDIT	---	---	---	---	---	---	(12324)
SERVICES, UTILITIES, NISC	1937	2043	2093	2473	2724	2368	1744
SLUDGE POND	1790	2022	1690	---	414	---	345
TOTAL DIRECT INVESTMENT	36008	38110	38675	43696	48537	41835	31151
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3241	3430	3481	3933	4368	3765	2804
CONSTRUCTION EXPENSE	5761	6098	6188	6991	7766	6694	4984
CONTRACTOR FEES	1800	1905	1934	2185	2427	2092	1558
CONTINGENCY	9362	9909	10056	11361	12620	13596	10384
ALLOWANCE FOR SHAKEDOWN	5438	5743	5864	6817	7530	6526	4825
INTEREST DURING CONSTRUCTION	9347	9893	10039	11343	12599	10860	8086
LAND	257	308	256	44	44	44	437
WORKING CAPITAL	431	431	365	502	616	332	337
TOTAL CAPITAL INVESTMENT	71645	75825	76857	86871	96507	85743	64566

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.196 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-1

PLANT SIZE: 500 MW

COAL: 0.95 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	2070	---	1971	---	---	---	2280
-LIMESTONE	---	1846	---	572	---	---	---
-SOFA ASH	---	---	97	---	1000	395	---
-MAGNESIUM OXIDE	---	---	---	92	---	---	---
-COAL	---	---	---	---	---	263	---
-CATALYST	---	---	---	2	---	3	---
UTILITIES							
-ELECTRICITY	1774	2008	983	1924	1833	2680	1769
-WATER	31	31	36	150	611	341	10
-STEAM	1326	1319	1327	1364	4278	---	---
-FUEL OIL	---	---	---	2164	---	862	---
-NATURAL GAS	---	---	---	---	291	---	---
-HEAT CREDIT	---	---	---	(94)	(13)	(220)	---
TOTAL VARIABLE O&M COST	5201	5204	4414	6173	8001	4324	4059
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	271
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	321	321	428	615	608	660	321
MAINTENANCE							
-LABOR & MATERIAL	2786	2942	1528	3051	3373	2904	1854
TOTAL FIXED O&M COST	3107	3263	1956	3666	3981	3564	2446
OVERHEAD							
-PLANT	1553	1632	978	1833	1990	1782	1223
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	132	77	96	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1315)	---	---	---
-SULFUR	---	---	---	---	(773)	(962)	---
NET OPERATING COST	9893	10130	7391	10550	13337	8870	7760
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.88	4.11	4.17	4.71	5.23	4.65	3.50
-LEVELIZED OPERATING COST (MILL/KWH)	4.60	4.71	3.44	4.90	6.20	4.12	3.61
TOTAL LEVELIZED COST (MILL/KWH)	8.48	8.82	7.60	9.62	11.43	8.77	7.11

TABLE G-1.197 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: WSCC-1		PLANT SIZE: 100 MW		COAL: 1.25 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	301	660	269	143	112	129	339
GAS HANDLING	2501	2487	2509	2732	2775	2967	2901
CHLORIDE PURGE	---	---	---	1701	887	---	---
SO ₂ ABSORPTION	4794	5057	4811	2851	4377	5002	7834
STACK GAS REHEAT	646	675	675	610	596	---	---
REGENERATION	---	---	53	1442	1622	1571	---
SLUDGE DISPOSAL	632	661	607	---	---	---	132
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	733	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	898	361	---
ESP CREDIT	---	---	---	---	---	---	(3537)
SERVICES, UTILITIES, MISC	533	572	535	613	676	602	460
SLUDGE POND	307	337	303	---	87	---	72
TOTAL DIRECT INVESTMENT	9716	10449	9761	10825	12031	10631	8201
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	874	940	879	974	1083	957	738
CONSTRUCTION EXPENSE	1554	1672	1562	1732	1925	1701	1312
CONTRACTOR FEES	486	522	488	541	602	532	410
CONTINGENCY	2526	2717	2538	2814	3128	3455	2779
ALLOWANCE FOR SHAKEDOWN	1485	1596	1492	1689	1868	1658	1272
INTEREST DURING CONSTRUCTION	2522	2712	2534	2810	3123	2760	2129
LAND	49	54	49	44	44	44	113
WORKING CAPITAL	73	71	56	84	182	57	49
TOTAL CAPITAL INVESTMENT	19285	20735	19358	21512	23986	21795	17003

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.198 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: WSCC-1 PLANT SIZE: 100 MW COAL: 1.25 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	193	---	184	---	---	---	213
-LIMESTONE	---	172	---	122	---	---	---
-SODA ASH	---	---	9	---	923	37	---
-MAGNESIUM OXIDE	---	---	---	9	---	---	---
-COAL	---	---	---	---	---	25	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	404	431	200	396	395	563	372
-WATER	6	6	7	23	123	74	2
-STEAM	278	253	279	286	899	---	---
-FUEL OIL	---	---	---	202	---	80	---
-NATURAL GAS	---	---	---	---	-32	---	---
-HEAT CREDIT	---	---	---	(9)	(-1)	(21)	---
TOTAL VARIABLE O&M COST	882	862	679	1029	2308	759	587
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	57
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	127	127	180	240	237	258	127
MAINTENANCE							
-LABOR & MATERIAL	934	1004	569	956	1058	933	640
TOTAL FIXED O&M COST	1061	1131	749	1196	1295	1192	823
OVERHEAD							
-PLANT	530	565	375	598	647	596	412
-ADMINISTRATIVE	13	13	18	24	24	26	13
-MARKETING	---	---	---	12	-8	9	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(123)	---	---	---
-SULFUR	---	---	---	---	(-85)	(90)	---
NET OPERATING COST	2485	2571	1821	2737	4351	2491	1834
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.23	5.62	5.25	5.83	6.50	5.91	4.61
-LEVELIZED OPERATING COST (MILL/KWH)	5.78	5.98	4.23	6.36	10.11	5.79	4.26
TOTAL LEVELIZED COST (MILL/KWH)	11.01	11.60	9.48	12.19	16.62	11.70	8.87

TABLE G-1.199 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: WSCC-1 PLANT SIZE: 100 MW COAL: 0.95 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	525	1011	476	238	201	231	586
GAS HANDLING	2528	2514	2536	2762	2805	2998	2933
CHLORIDE PURGE	---	---	---	1720	897	---	---
SO2 ABSORPTION	4845	3109	4864	2882	4425	5056	7914
STACK GAS REHEAT	653	682	682	616	603	---	---
REGENERATION	---	---	87	2306	2592	2510	---
SLUDGE DISPOSAL	830	868	972	---	---	---	216
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1290	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1598	642	---
ESP CREDIT	---	---	---	---	---	---	(3569)
SERVICES, UTILITIES, MISC	563	611	577	709	787	686	485
SLUDGE POND	569	631	554	---	88	---	73
TOTAL DIRECT INVESTMENT	10513	11425	10747	12521	13995	12125	8636
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	946	1028	967	1127	1260	1091	777
CONSTRUCTION EXPENSE	1682	1828	1719	2003	2239	1940	1382
CONTRACTOR FEES	526	571	537	626	700	606	432
CONTINGENCY	2733	2971	2794	3256	3639	3941	2879
ALLOWANCE FOR SHAKEDOWN	1583	1719	1621	1953	2174	1891	1340
INTEREST DURING CONSTRUCTION	2729	2966	2790	3250	3633	3147	2242
LAND	76	87	76	44	44	44	114
WORKING CAPITAL	94	91	77	108	189	70	72
TOTAL CAPITAL INVESTMENT	20882	22687	21329	24888	27873	24856	17874

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.200 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-1

PLANT SIZE: 100 MW

COAL: 0.95 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESTA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LINE	440	---	419	---	---	---	484
-LIMESTONE	---	392	---	122	---	---	---
-SODA ASH	---	---	21	---	949	84	---
-MAGNESIUM OXIDE	---	---	---	19	---	---	---
-COAL	---	---	---	---	---	56	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	410	440	209	420	402	569	376
-WATER	7	7	8	32	134	72	2
-STEAM	282	260	282	290	909	---	---
-FUEL OIL	---	---	---	460	---	183	---
-NATURAL GAS	---	---	---	---	9	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(47)	---
TOTAL VARIABLE O&M COST	1138	1098	938	1324	2402	918	862
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	58
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	120	120	171	227	225	244	120
MAINTENANCE							
-LABOR & MATERIAL	994	1080	620	1106	1231	1065	674
TOTAL FIXED O&M COST	1114	1200	791	1333	1455	1309	851
OVERHEAD							
-PLANT	557	600	396	666	728	654	426
-ADMINISTRATIVE	12	12	17	23	22	24	12
-MARKETING	---	---	---	28	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(279)	---	---	---
-SULFUR	---	---	---	---	(25)	(204)	---
NET OPERATING COST	2821	2910	2141	3094	4585	2722	2151
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL./KWH)	5.66	6.15	5.78	6.75	7.56	6.74	4.85
-LEVELIZED OPERATING COST (MILL./KWH)	6.56	6.76	4.98	7.19	10.66	6.33	5.00
TOTAL LEVELIZED COST (MILL./KWH)	12.22	12.91	10.76	13.94	18.21	13.07	9.85

TABLE G-1.201 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: WSCC-2		PLANT SIZE: 500 MW		COAL: 0.95 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1508	2290	1414	618	599	689	1653
GAS HANDLING	9801	9811	9590	10449	10612	11344	11375
CHLORINE PURGE	---	---	---	7505	3914	---	---
SO2 ABSORPTION	17356	18305	19136	11313	17325	19798	28216
STACK GAS REHEAT	2533	2501	2501	2358	2324	---	---
REGENERATION	---	---	217	5547	6229	6033	---
SLUDGE DISPOSAL	1381	1443	2348	---	---	---	543
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3711	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4690	1885	---
ESP CREDIT	---	---	---	---	---	---	(12440)
SERVICES, UTILITIES, MISC	1955	2061	2112	2490	2742	2385	1761
SLUDGE POND	1776	2006	1677	---	418	---	349
TOTAL DIRECT INVESTMENT	36310	38417	38995	43992	48854	42135	31456
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3268	3458	3510	3959	4397	3792	2831
CONSTRUCTION EXPENSE	5810	6147	6239	7039	7817	6742	5033
CONTRACTOR FEES	1815	1921	1950	2200	2443	2107	1573
CONTINGENCY	9441	9988	10139	11438	12702	13694	10486
ALLOWANCE FOR SHAKEDOWN	5487	5792	5915	6863	7579	6573	4872
INTEREST DURING CONSTRUCTION	9425	9972	10122	11419	12682	10938	8166
LAND	125	150	125	22	22	22	175
WORKING CAPITAL	393	370	328	510	623	338	295
TOTAL CAPITAL INVESTMENT	72074	76215	77323	87441	97117	86339	64887

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.202 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: WSCC-2		PLANT SIZE: 500 MW		COAL: 0.95 % SULFUR		
		LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST								
(VARIABLE)								
RAW MATERIAL								
-LIME		1588	---	1512	---	---	---	1748
-LIMESTONE		---	1074	---	444	---	---	---
-SODA ASH		---	---	95	---	991	388	---
-MAGNESIUM OXIDE		---	---	---	96	---	---	---
-COAL		---	---	---	---	---	235	---
-CATALYST		---	---	---	2	---	2	---
UTILITIES								
-ELECTRICITY		1793	2031	994	1942	1854	2711	1790
-WATER		31	31	36	150	616	345	11
-STEAM		1341	1334	1342	1380	4328	---	---
-FUEL OIL		---	---	---	2355	---	938	---
-NATURAL GAS		---	---	---	---	313	---	---
-HEAT CREDIT		---	---	---	(93)	(13)	(218)	---
TOTAL VARIABLE O&M COST		4753	4470	3979	6276	8089	4401	3549
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	217
LABOR								
-OPERATING, ANALYSIS, SUPERVISION		321	321	428	615	608	660	321
MAINTENANCE								
-LABOR & MATERIAL		2811	2967	1541	3072	3394	2925	1872
TOTAL FIXED O&M COST		3132	3288	1969	3687	4002	3585	2410
OVERHEAD								
-PLANT		1566	1644	985	1843	2001	1792	1205
-ADMINISTRATIVE		32	32	43	62	61	66	32
-MARKETING		---	---	---	130	76	95	---
BYPRODUCT SALES								
-SULFURIC ACID		---	---	---	(1301)	---	---	---
-SULFUR		---	---	---	---	(763)	(952)	---
NET OPERATING COST		9483	9435	6976	10696	13467	8988	7196
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL./KWH)		3.91	4.13	4.19	4.74	5.27	4.68	3.52
-LEVELIZED OPERATING COST (MILL./KWH)		4.41	4.39	3.24	4.97	6.26	4.18	3.35
TOTAL LEVELIZED COST (MILL./KWH)		8.32	8.52	7.44	9.71	11.53	8.86	6.86

TABLE G-1.203 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-2

PLANT SIZE: 500 MW

COAL: 0.50 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	969	1623	896	415	380	437	1070
GAS HANDLING	9827	9837	9615	10477	10640	11374	11406
CHLORIDE PURGE	---	---	---	7526	3925	---	---
SO2 ABSORPTION	17401	18352	19188	11344	17372	19852	28287
STACK GAS REHEAT	2540	2508	2508	2365	2330	---	---
REGENERATION	---	---	148	3846	4321	4185	---
SLUDGE DISPOSAL	1116	1167	1625	---	---	---	369
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2388	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2992	1203	---
ESP CREDIT	---	---	---	---	---	---	(12468)
SERVICES, UTILITIES, MISC	1911	2009	2039	2302	2518	2223	1720
SLUDGE POND	1108	1242	1060	---	420	---	350
TOTAL DIRECT INVESTMENT	34872	36737	37078	40660	44898	39274	30734
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3139	3306	3337	3659	4041	3535	2766
CONSTRUCTION EXPENSE	5580	5878	5932	6506	7184	6284	4917
CONTRACTOR FEES	1744	1837	1854	2033	2245	1964	1537
CONTINGENCY	9067	9552	9640	10572	11673	12764	9988
ALLOWANCE FOR SHAKEDOWN	5329	5607	5678	6343	6962	6127	4759
INTEREST DURING CONSTRUCTION	9052	9536	9625	10555	11655	10195	7978
LAND	72	85	72	22	22	22	147
WORKING CAPITAL	331	326	263	411	607	285	226
TOTAL CAPITAL INVESTMENT	69186	72864	73480	80760	89286	80448	63053

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.204 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-2

PLANT SIZE: 500 MW

COAL: 0.50 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	836	---	796	---	---	---	920
-LIMESTONE	---	365	---	444	---	---	---
-SODA ASH	---	---	50	---	969	204	---
-MAGNESIUM OXIDE	---	---	---	51	---	---	---
-COAL	---	---	---	---	---	124	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	1791	2019	971	1867	1851	2719	1795
-WATER	30	30	36	113	580	327	10
-STEAM	1345	1325	1346	1384	4341	---	---
-FUEL OIL	---	---	---	1239	---	494	---
-NATURAL GAS	---	---	---	---	130	---	---
-HEAT CREDIT	---	---	---	(49)	(5)	(115)	---
TOTAL VARIABLE O&M COST	4001	3939	3199	5050	7865	3755	2725
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	180
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	311	311	415	596	589	639	311
MAINTENANCE							
-LABOR & MATERIAL	2729	2871	1471	2839	3118	2726	1829
TOTAL FIXED O&M COST	3040	3182	1885	3435	3707	3365	2319
OVERHEAD							
-PLANT	1520	1591	943	1717	1853	1682	1160
-ADMINISTRATIVE	31	31	41	60	59	64	31
-MARKETING	---	---	---	68	32	50	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(685)	---	---	---
-SULFUR	---	---	---	---	(316)	(501)	---
NET OPERATING COST	8592	8743	6068	9645	13199	8415	6235
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.75	3.95	3.98	4.38	4.84	4.36	3.42
-LEVELIZED OPERATING COST (MILL/KWH)	3.99	4.06	2.82	4.48	6.14	3.91	2.90
TOTAL LEVELIZED COST (MILL/KWH)	7.75	8.02	6.81	8.86	10.98	8.27	6.32

TABLE G-1.205 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: WSCC-2

PLANT SIZE: 100 MW

COAL: 0.95 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	521	1005	473	236	199	229	581
GAS HANDLING	2556	2542	2563	2792	2836	3031	2965
CHLORINE PURGE	---	---	---	1739	907	---	---
SO ₂ ABSORPTION	4896	5163	4918	2914	4474	5113	7996
STACK GAS REHEAT	660	689	689	623	610	---	---
REGENERATION	---	---	86	2292	2576	2495	---
SLUDGE DISPOSAL	827	864	966	---	---	---	214
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1280	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1586	637	---
ESP CREDIT	---	---	---	---	---	---	(3602)
SERVICES, UTILITIES, MISC	568	616	582	713	791	690	489
SLUDGE POND	564	626	549	---	89	---	74
TOTAL DIRECT INVESTMENT	10592	11505	10826	12588	14067	12196	8718
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	953	1035	974	1133	1266	1098	785
CONSTRUCTION EXPENSE	1695	1841	1732	2014	2251	1951	1395
CONTRACTOR FEES	530	575	541	629	703	610	436
CONTINGENCY	2754	2991	2815	3273	3657	3964	2906
ALLOWANCE FOR SHAKEDOWN	1596	1732	1634	1964	2186	1903	1353
INTEREST DURING CONSTRUCTION	2750	2986	2810	3268	3652	3166	2263
LAND	37	43	37	22	22	22	48
WORKING CAPITAL	86	78	70	109	189	72	63
TOTAL CAPITAL INVESTMENT	20992	22787	21440	24999	27993	24980	17965

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.206 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: WSCC-2		PLANT SIZE: 100 MW		COAL: 0.95 % SULFUR		
		LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST								
(VARIABLE)								
RAW MATERIAL								
-LIME	337	---	321	---	---	---	---	371
-LIMESTONE	---	228	---	94	---	---	---	---
-SODA ASH	---	---	20	---	940	82	---	---
-MAGNESIUM OXIDE	---	---	---	20	---	---	---	---
-COAL	---	---	---	---	---	50	---	---
-CATALYST	---	---	---	0	---	0	---	---
UTILITIES								
-ELECTRICITY	415	445	211	424	406	576	380	
-WATER	7	7	8	32	135	73	2	
-STEAM	285	263	285	293	919	---	---	
-FUEL OIL	---	---	---	500	---	199	---	
-NATURAL GAS	---	---	---	---	9	---	---	
-HEAT CREDIT	---	---	---	(20)	(0)	(46)	---	
TOTAL VARIABLE O&M COST		1043	942	845	1346	2409	935	754
(FIXED)								
WASTE DISPOSAL (TRUCKING)		---	---	---	---	---	---	46
LABOR								
-OPERATING, ANALYSIS, SUPERVISION	120	120	171	227	225	244	120	
MAINTENANCE								
-LABOR & MATERIAL	1002	1088	625	1112	1237	1071	680	
TOTAL FIXED O&M COST		1122	1208	796	1339	1462	1315	846
OVERHEAD								
-PLANT	561	604	398	669	731	658	423	
-ADMINISTRATIVE	12	12	17	23	22	24	12	
-MARKETING	---	---	---	28	2	20	---	
BYPRODUCT SALES								
-SULFURIC ACID	---	---	---	(276)	---	---	---	
-SULFUR	---	---	---	---	(23)	(202)	---	
NET OPERATING COST		2739	2766	2056	3128	4604	2750	2035
LEVELIZED - 20 YEARS								
-LEVELIZED CAPITAL COST (MILL/KWH)	5.69	5.18	5.81	6.78	7.59	6.77	4.87	
-LEVELIZED OPERATING COST (MILL/KWH)	6.37	5.43	4.78	7.27	10.70	6.39	4.73	
TOTAL LEVELIZED COST (MILL/KWH)		12.06	12.61	10.59	14.05	18.29	13.16	9.60

APPLICATION: RETROFIT

REGION: WSCC-2

PLANT SIZE: 100 MW

COAL: 0.50% SULFUR

	LINE	LINESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	338	720	302	159	126	145	379
GAS HANDLING	2563	2549	2570	2799	2843	3039	2973
CHLORIDE PURGE	---	---	---	1743	909	---	---
SO2 ABSORPTION	4908	5176	4931	2922	4486	5127	8016
STACK GAS REHEAT	662	691	691	624	611	---	---
REGENERATION	---	---	59	1589	1787	1730	---
SLUDGE DISPOSAL	668	699	669	---	---	---	146
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	824	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1012	407	---
ESP CREDIT	---	---	---	---	---	---	(3611)
SERVICES, UTILITIES, MISC	548	590	553	640	706	627	474
SLUDGE POND	349	384	343	---	89	---	74
TOTAL DIRECT INVESTMENT	10037	10809	10118	11300	12570	11075	8452
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	903	973	911	1017	1131	997	761
CONSTRUCTION EXPENSE	1606	1729	1619	1808	2011	1772	1352
CONTRACTOR FEES	502	540	506	565	629	554	423
CONTINGENCY	2610	2810	2631	2938	3268	3599	2747
ALLOWANCE FOR SHUTDOWN	1531	1648	1544	1763	1952	1728	1311
INTEREST DURING CONSTRUCTION	2605	2806	2627	2933	3263	2875	2194
LAND	26	29	26	22	22	22	42
WORKING CAPITAL	73	69	56	88	185	61	48
TOTAL CAPITAL INVESTMENT	19892	21413	20037	22434	25031	22682	17329

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.208 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-2

PLANT SIZE: 100 MW

COAL: 0.50 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LINE	178	---	169	---	---	---	195
-LIMESTONE	---	120	---	94	---	---	---
-SODA ASH	---	---	11	---	920	43	---
-MAGNESIUM OXIDE	---	---	---	11	---	---	---
-COAL	---	---	---	---	---	26	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	414	442	206	409	405	578	381
-WATER	6	6	8	25	127	70	2
-STEAM	286	261	286	294	922	---	---
-FUEL OIL	---	---	---	263	---	105	---
-NATURAL GAS	---	---	---	---	-28	---	---
-HEAT CREDIT	---	---	---	(10)	(-1)	(24)	---
TOTAL VARIABLE O&M COST	884	829	680	1085	2347	798	579
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	38
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	110	110	158	207	205	223	110
MAINTENANCE							
-LABOR & MATERIAL	962	1036	589	998	1105	972	659
TOTAL FIXED O&M COST	1072	1146	747	1205	1310	1195	807
OVERHEAD							
-PLANT	536	573	373	603	655	598	403
-ADMINISTRATIVE	11	11	16	21	21	22	11
-MARKETING	---	---	---	15	-7	11	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(145)	---	---	---
-SULFUR	---	---	---	---	(-69)	(106)	---
NET OPERATING COST	2503	2559	1815	2783	4395	2517	1800
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.39	5.81	5.43	6.08	6.79	6.15	4.70
-LEVELIZED OPERATING COST (MILL/KWH)	5.82	5.95	4.22	6.47	10.22	5.85	4.18
TOTAL LEVELIZED COST (MILL/KWH)	11.21	11.75	9.65	12.55	17.00	12.00	8.88

TABLE G-1.209 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: WSCC-3 PLANT SIZE: 500 MW COAL: 1.15 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1533	2320	1439	627	609	701	1680
GAS HANDLING	9083	9089	8899	9696	9848	10527	10542
CHLORIDE PURGE	---	---	---	6956	3628	---	---
SO2 ABSORPTION	16151	17034	17721	10478	16049	18339	26263
STACK GAS REHEAT	2348	2325	2325	2187	2155	---	---
REGENERATION	---	---	220	5623	6315	6116	---
SLUDGE DISPOSAL	1392	1454	2380	---	---	---	551
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3773	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4769	1917	---
ESP CREDIT	---	---	---	---	---	---	(11663)
SERVICES, UTILITIES, MISC	1830	1933	1979	2360	2602	2256	1642
SLUDGE POND	1807	2042	1706	---	386	---	322
TOTAL DIRECT INVESTMENT	34145	36198	36669	41700	46360	39857	29337
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	3073	3258	3300	3753	4172	3587	2640
CONSTRUCTION EXPENSE	5463	5792	5867	6672	7418	6377	4694
CONTRACTOR FEES	1707	1810	1833	2085	2318	1993	1467
CONTINGENCY	8878	9411	9534	10842	12054	12953	9889
ALLOWANCE FOR SHAKEDOWN	5146	5443	5550	6505	7194	6218	4544
INTEREST DURING CONSTRUCTION	8863	9396	9519	10825	12034	10346	7615
LAND	326	391	325	55	55	55	432
WORKING CAPITAL	365	406	308	465	617	326	274
TOTAL CAPITAL INVESTMENT	67967	72104	72904	82902	92222	81712	60892

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.210 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1990 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: WSCC-3 PLANT SIZE: 500 MW COAL: 1.15 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1485	---	1414	---	---	---	1635
-LIMESTONE	---	1760	---	405	---	---	---
-SODA ASH	---	---	124	---	1265	506	---
-MAGNESIUM OXIDE	---	---	---	99	---	---	---
-COAL	---	---	---	---	---	301	---
-CATALYST	---	---	---	2	---	3	---
UTILITIES							
-ELECTRICITY	1663	1880	922	1811	1715	2502	1651
-WATER	29	29	33	147	577	325	10
-STEAM	1238	1229	1239	1273	3993	---	---
-FUEL OIL	---	---	---	2083	---	830	---
-NATURAL GAS	---	---	---	---	448	---	---
-HEAT CREDIT	---	---	---	(95)	(13)	(223)	---
TOTAL VARIABLE O&M COST	4414	4898	3732	5724	7985	4244	3296
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	210
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	326	326	434	624	617	669	326
MAINTENANCE							
-LABOR & MATERIAL	2636	2789	1448	2912	3222	2767	1746
TOTAL FIXED O&M COST	2962	3114	1882	3536	3838	3436	2282
OVERHEAD							
-PLANT	1481	1557	941	1768	1919	1718	1141
-ADMINISTRATIVE	33	33	43	62	62	67	33
-MARKETING	---	---	---	133	79	97	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1333)	---	---	---
-SULFUR	---	---	---	---	(786)	(975)	---
NET OPERATING COST	8890	9602	6598	9891	13097	8588	6751
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.69	3.91	3.95	4.50	5.00	4.43	3.30
-LEVELIZED OPERATING COST (MILL/KWH)	4.13	4.46	3.07	4.60	6.09	3.99	3.14
TOTAL LEVELIZED COST (MILL/KWH)	7.82	8.37	7.02	9.09	11.09	8.42	6.44

TABLE G-1.211 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1,0015/13/81

APPLICATION: RETROFIT REGION: WSCC-3 PLANT SIZE: 500 MW COAL: 0.55 % SULFUR							
	LIME	LINESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	922	1562	852	397	361	415	1019
GAS HANDLING	9119	9125	8933	9734	9886	10567	10583
CHLORIDE PURGE	---	---	---	6983	3642	---	---
SO2 ABSORPTION	16211	17097	17791	10519	16112	18412	26360
STACK GAS REHEAT	2357	2333	2333	2195	2163	---	---
REGENERATION	---	---	142	3691	4148	4017	---
SLUDGE DISPOSAL	1090	1139	1560	---	---	---	354
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2273	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	2846	1144	---
ESP CREDIT	---	---	---	---	---	---	(11702)
SERVICES, UTILITIES, MISC	1782	1875	1897	2148	2349	2073	1597
SLUDGE POND	1051	1176	1007	---	388	---	323
TOTAL DIRECT INVESTMENT	32532	34309	34514	37939	41893	36628	28534
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2928	3088	3106	3415	3770	3297	2568
CONSTRUCTION EXPENSE	5205	5489	5522	6070	6703	5861	4565
CONTRACTOR FEES	1627	1715	1726	1897	2095	1831	1427
CONTINGENCY	8458	8920	8974	9864	10892	11904	9300
ALLOWANCE FOR SHAKEDOWN	4970	5235	5283	5919	6497	5714	4419
INTEREST DURING CONSTRUCTION	8445	8906	8959	9848	10875	9508	7407
LAND	174	205	173	55	55	55	352
WORKING CAPITAL	301	327	240	367	592	266	203
TOTAL CAPITAL INVESTMENT	64639	68195	68497	75375	83372	75064	58776

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.212 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT		REGION: WSCC-3		PLANT SIZE: 500 MW		COAL: 0.55 % SULFUR	
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							

(VARIABLE)							
RAW MATERIAL							
-LIME	710	---	676	---	---	---	782
-LIMESTONE	---	842	---	405	---	---	---
-SODA ASH	---	---	59	---	1233	242	---
-MAGNESIUM OXIDE	---	---	---	47	---	---	---
-COAL	---	---	---	---	---	144	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	1661	1868	897	1728	1712	2512	1658
-WATER	28	28	33	105	537	304	9
-STEAM	1243	1219	1244	1278	4010	---	---
-FUEL OIL	---	---	---	996	---	397	---
-NATURAL GAS	---	---	---	---	161	---	---
-HEAT CREDIT	---	---	---	(45)	(5)	(107)	---
TOTAL VARIABLE O&M COST	3642	3957	2910	4515	7648	3494	2449
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	168
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	312	312	416	598	591	641	312
MAINTENANCE							
-LABOR & MATERIAL	2545	2681	1369	2649	2910	2543	1698
TOTAL FIXED O&M COST	2857	2993	1785	3247	3500	3184	2177
OVERHEAD							
-PLANT	1428	1496	892	1623	1750	1592	1089
-ADMINISTRATIVE	31	31	42	60	59	64	31
-MARKETING	---	---	---	64	28	47	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(637)	---	---	---
-SULFUR	---	---	---	---	(282)	(466)	---
NET OPERATING COST	7958	8477	5629	8872	12704	7914	5746
LEVELIZED - 20 YEARS							

-LEVELIZED CAPITAL COST (MILL/KWH)	3.50	3.70	3.71	4.09	4.52	4.07	3.19
-LEVELIZED OPERATING COST (MILL/KWH)	3.70	3.94	2.62	4.12	5.91	3.68	2.67
TOTAL LEVELIZED COST (MILL/KWH)	7.20	7.64	6.33	8.21	10.43	7.75	5.86

TABLE G-1.213 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: WSCC-3 PLANT SIZE: 100 MW COAL: 1.15 % SULFUR							
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	530	1018	481	240	203	233	591
GAS HANDLING	2369	2355	2378	2590	2631	2813	2748
CHLORIDE PURGE	---	---	---	1611	840	---	---
SO ₂ ABSORPTION	4554	4804	4554	2699	4144	4736	7443
STACK GAS REHEAT	612	640	640	578	565	---	---
REGENERATION	---	---	87	2323	2612	2529	---
SLUDGE DISPOSAL	833	871	980	---	---	---	217
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1301	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1613	648	---
ESP CREDIT	---	---	---	---	---	---	(3378)
SERVICES, UTILITIES, MISC.	534	581	547	681	754	658	457
SLUDGE POND	575	637	559	---	82	---	68
TOTAL DIRECT INVESTMENT	10008	10908	10227	12023	13447	11617	8147
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	901	982	920	1082	1210	1046	733
CONSTRUCTION EXPENSE	1401	1745	1636	1924	2151	1859	1303
CONTRACTOR FEES	500	545	511	601	672	581	407
CONTINGENCY	2602	2836	2659	3126	3496	3776	2746
ALLOWANCE FOR SHAKEDOWN	1504	1638	1540	1876	2089	1812	1264
INTEREST DURING CONSTRUCTION	2598	2831	2655	3121	3491	3016	2115
LAND	96	110	96	55	55	55	119
WORKING CAPITAL	80	86	65	100	203	69	58
TOTAL CAPITAL INVESTMENT	19891	21681	20310	23908	26815	23830	16893

NOTE: AQUEOUS CARBONATE SYSTEM: SO₂ ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.214 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT REGION: WSCC-3 PLANT SIZE: 100 MW COAL: 1.15 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	315	---	300	---	---	---	347
-LIMESTONE	---	374	---	86	---	---	---
-SODA ASH	---	---	26	---	1200	108	---
-MAGNESIUM OXIDE	---	---	---	21	---	---	---
-COAL	---	---	---	---	---	64	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	384	412	196	396	376	531	351
-WATER	6	6	7	32	126	69	2
-STEAM	263	242	263	270	848	---	---
-FUEL OIL	---	---	---	443	---	176	---
-NATURAL GAS	---	---	---	---	16	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(47)	---
TOTAL VARIABLE O&M COST	969	1034	793	1228	2565	902	700
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	45
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	125	125	177	236	233	254	125
MAINTENANCE							
-LABOR & MATERIAL	944	1028	589	1062	1183	1020	636
TOTAL FIXED O&M COST	1069	1153	766	1298	1416	1274	805
OVERHEAD							
-PLANT	534	576	383	649	708	637	402
-ADMINISTRATIVE	12	12	18	24	23	25	12
-MARKETING	---	---	---	28	3	21	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(283)	---	---	---
-SULFUR	---	---	---	---	(27)	(207)	---
NET OPERATING COST	2585	2776	1960	2943	4688	2651	1920
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL./KWH)	5.39	5.88	5.51	6.48	7.27	6.46	4.58
-LEVELIZED OPERATING COST (MILL./KWH)	6.01	6.45	4.56	6.84	10.90	6.16	4.46
TOTAL LEVELIZED COST (MILL./KWH)	11.40	12.33	10.06	13.32	18.17	12.62	9.04

APPLICATION: RETROFIT

REGION: WSCC-3

PLANT SIZE: 100 MW

COAL: 0.55 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	322	694	288	152	120	138	361
GAS HANDLING	2378	2364	2388	2600	2641	2823	2759
CHLORIDE PURGE	---	---	---	1618	844	---	---
SO2 ABSORPTION	4573	4822	4572	2710	4161	4755	7470
STACK GAS REHEAT	614	643	643	580	567	---	---
REGENERATION	---	---	56	1525	1715	1661	---
SLUDGE DISPOSAL	653	683	642	---	---	---	140
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	784	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	962	387	---
ESP CREDIT	---	---	---	---	---	---	(3389)
SERVICES, UTILITIES, MISC	512	552	515	598	661	586	440
SLUDGE POND	331	363	326	---	82	---	69
TOTAL DIRECT INVESTMENT	9383	10122	9429	10567	11754	10350	7850
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	844	911	849	951	1058	932	707
CONSTRUCTION EXPENSE	1501	1619	1509	1691	1881	1656	1256
CONTRACTOR FEES	469	506	471	528	588	518	393
CONTINGENCY	2439	2632	2452	2747	3056	3364	2559
ALLOWANCE FOR SHAKEDOWN	1431	1543	1438	1648	1825	1615	1218
INTEREST DURING CONSTRUCTION	2436	2627	2448	2743	3051	2687	2038
LAND	64	71	64	55	55	55	102
WORKING CAPITAL	67	69	51	79	196	56	43
TOTAL CAPITAL INVESTMENT	18634	20099	18711	21010	23463	21232	16164

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.216 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-3

PLANT SIZE: 100 MW

COAL: 0.55 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	151	---	144	---	---	---	166
-LIMESTONE	---	179	---	86	---	---	---
-SODA ASH	---	---	13	---	1170	51	---
-MAGNESIUM OXIDE	---	---	---	10	---	---	---
-COAL	---	---	---	---	---	31	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	384	409	191	378	375	534	352
-WATER	6	6	7	23	118	65	2
-STEAM	264	240	264	272	852	---	---
-FUEL OIL	---	---	---	212	---	84	---
-NATURAL GAS	---	---	---	---	-43	---	---
-HEAT CREDIT	---	---	---	(10)	(-1)	(23)	---
TOTAL VARIABLE O&M COST	805	834	618	971	2472	742	520
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	36
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	111	111	159	210	207	225	111
MAINTENANCE							
-LABOR & MATERIAL	899	970	548	933	1033	909	612
TOTAL FIXED O&M COST	1010	1081	708	1143	1240	1134	759
OVERHEAD							
-PLANT	505	540	354	571	620	567	379
-ADMINISTRATIVE	11	11	16	21	21	23	11
-MARKETING	---	---	---	14	-8	10	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(135)	---	---	---
-SULFUR	---	---	---	---	(-76)	(99)	---
NET OPERATING COST	2331	2466	1696	2584	4422	2376	1669
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.05	5.45	5.07	5.70	6.36	5.76	4.38
-LEVELIZED OPERATING COST (MILL/KWH)	5.42	5.73	3.94	6.01	10.28	5.52	3.88
TOTAL LEVELIZED COST (MILL/KWH)	10.47	11.18	9.01	11.70	16.64	11.28	8.26

TABLE G-1.217 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT REGION: WSCC-4 PLANT SIZE: 500 MW COAL: 1.00 % SULFUR							
	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	1507	2289	1414	618	598	689	1652
GAS HANDLING	8654	8657	8485	9245	9389	10037	10043
CHLORIDE PURGE	---	---	---	6626	3456	---	---
SO2 ABSORPTION	15428	16271	16875	9978	15284	17466	25090
STACK GAS REHEAT	2237	2219	2219	2084	2053	---	---
REGENERATION	---	---	217	5544	6227	6030	---
SLUDGE DISPOSAL	1380	1442	2346	---	---	---	543
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	3709	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	4687	1884	---
ESP CREDIT	---	---	---	---	---	---	(11194)
SERVICES, UTILITIES, MISC	1752	1853	1893	2268	2502	2166	1568
SLUDGE POND	1775	2005	1676	---	367	---	306
TOTAL DIRECT INVESTMENT	32732	34736	35124	40073	44563	38273	28007
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2946	3126	3161	3607	4011	3445	2521
CONSTRUCTION EXPENSE	5237	5558	5620	6412	7130	6124	4481
CONTRACTOR FEES	1637	1737	1756	2004	2228	1914	1400
CONTINGENCY	8510	9031	9132	10419	11586	12439	9362
ALLOWANCE FOR SHAKEDOWN	4929	5218	5312	6251	6915	5971	4339
INTEREST DURING CONSTRUCTION	8497	9017	9118	10402	11568	9935	7270
LAND	125	150	125	22	22	22	289
WORKING CAPITAL	356	353	303	441	597	312	270
TOTAL CAPITAL INVESTMENT	64969	68926	69652	79630	88620	78432	57940

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.218 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.00:5/13/81

APPLICATION: RETROFIT

REGION: WSCC-4

PLANT SIZE: 500 MW

COAL: 1.00 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	1518	---	1445	---	---	---	1671
-LIMESTONE	---	1288	---	424	---	---	---
-SODA ASH	---	---	139	---	1454	568	---
-MAGNESIUM OXIDE	---	---	---	98	---	---	---
-COAL	---	---	---	---	---	252	---
-CATALYST	---	---	---	2	---	3	---
UTILITIES							
-ELECTRICITY	1585	1789	877	1727	1631	2376	1568
-WATER	27	28	32	142	551	304	9
-STEAM	1176	1165	1177	1209	3793	---	---
-FUEL OIL	---	---	---	1925	---	767	---
-NATURAL GAS	---	---	---	---	302	---	---
-HEAT CREDIT	---	---	---	(93)	(13)	(218)	---
TOTAL VARIABLE O&M COST	4305	4270	3670	5434	7719	4052	3249
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	370
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	322	322	430	617	610	662	322
MAINTENANCE							
-LABOR & MATERIAL	2525	2674	1387	2798	3097	2657	1667
TOTAL FIXED O&M COST	2847	2996	1816	3415	3707	3319	2359
OVERHEAD							
-PLANT	1424	1498	908	1708	1854	1660	1180
-ADMINISTRATIVE	32	32	43	62	61	66	32
-MARKETING	---	---	---	130	76	95	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(1300)	---	---	---
-SULFUR	---	---	---	---	(762)	(951)	---
NET OPERATING COST	8608	8795	6437	9448	12655	8241	6820
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.52	3.74	3.78	4.32	4.81	4.25	3.14
-LEVELIZED OPERATING COST (MILL/KWH)	4.00	4.09	2.99	4.39	5.88	3.83	3.17
TOTAL LEVELIZED COST (MILL/KWH)	7.52	7.83	6.77	8.71	10.69	8.08	6.31

APPLICATION: RETROFIT	REGION: WSCC-4	PLANT SIZE: 500 MW	COAL: 0.55 % SULFUR				
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
MATERIALS HANDLING/PREPARATION	998	1661	924	426	391	451	1102
GAS HANDLING	8679	8683	8509	9272	9416	10066	10072
CHLORIDE PURGE	---	---	---	6646	3466	---	---
SO2 ABSORPTION	15470	16315	16925	10008	15329	17517	25159
STACK GAS REHEAT	2243	2225	2225	2090	2059	---	---
REGENERATION	---	---	152	3942	4428	4289	---
SLUDGE DISPOSAL	1132	1184	1666	---	---	---	379
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	2460	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	3084	1240	---
ESP CREDIT	---	---	---	---	---	---	(11221)
SERVICES, UTILITIES, MISC	1711	1804	1824	2091	2290	2014	1529
SLUDGE POND	1144	1282	1093	---	368	---	307
TOTAL DIRECT INVESTMENT	31378	33154	33317	36933	40833	35576	27326
INDIRECT INVESTMENT	-----	-----	-----	-----	-----	-----	-----
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	2824	2984	2999	3324	3675	3202	2459
CONSTRUCTION EXPENSE	5020	5305	5331	5909	6533	5692	4372
CONTRACTOR FEES	1569	1658	1666	1847	2042	1779	1366
CONTINGENCY	8158	8620	8662	9603	10617	11562	8906
ALLOWANCE FOR SHAKEDOWN	4781	5044	5088	5762	6333	5550	4232
INTEREST DURING CONSTRUCTION	8145	8606	8649	9587	10600	9235	7093
LAND	75	89	75	22	22	22	262
WORKING CAPITAL	300	303	242	363	582	261	208
TOTAL CAPITAL INVESTMENT	62249	65763	66028	73349	81236	72879	56226

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.220 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-4

PLANT SIZE: 500 MW

COAL: 0.55 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LINE	835	---	795	---	---	---	919
-LIMESTONE	---	708	---	424	---	---	---
-SODA ASH	---	---	76	---	1425	313	---
-MAGNESIUM OXIDE	---	---	---	54	---	---	---
-COAL	---	---	---	---	---	138	---
-CATALYST	---	---	---	1	---	1	---
UTILITIES							
-ELECTRICITY	1582	1777	856	1656	1628	2384	1573
-WATER	26	26	31	106	517	289	9
-STEAM	1179	1157	1180	1213	3805	---	---
-FUEL OIL	---	---	---	1059	---	422	---
-NATURAL GAS	---	---	---	---	134	---	---
-HEAT CREDIT	---	---	---	(51)	(6)	(120)	---
TOTAL VARIABLE O&M COST	3623	3669	2939	4462	7503	3427	2501
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	335
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	312	312	416	598	591	641	312
MAINTENANCE							
-LABOR & MATERIAL	2448	2583	1320	2579	2836	2470	1626
TOTAL FIXED O&M COST	2760	2895	1736	3177	3427	3111	2272
OVERHEAD							
-PLANT	1380	1448	868	1588	1714	1555	1136
-ADMINISTRATIVE	31	31	42	60	59	64	31
-MARKETING	---	---	---	72	34	52	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(715)	---	---	---
-SULFUR	---	---	---	---	(338)	(523)	---
NET OPERATING COST	7794	8042	5585	8643	12399	7686	5941
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	3.38	3.57	3.58	3.98	4.40	3.95	3.05
-LEVELIZED OPERATING COST (MILL/KWH)	3.62	3.74	2.60	4.02	5.76	3.57	2.76
TOTAL LEVELIZED COST (MILL/KWH)	7.00	7.30	6.18	8.00	10.17	7.53	5.81

TABLE G-1.221 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-4

PLANT SIZE: 100 MW

COAL: 1.00 % SULFUR

	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	521	1005	473	236	199	229	581
GAS HANDLING	2257	2243	2268	2470	2509	2682	2618
CHLORIDE PURGE	---	---	---	1535	801	---	---
SO2 ABSORPTION	4352	4589	4337	2570	3947	4510	7110
STACK GAS REHEAT	583	611	611	551	538	---	---
REGENERATION	---	---	86	2291	2575	2494	---
SLUDGE DISPOSAL	826	864	966	---	---	---	214
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	1279	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1585	637	---
ESP CREDIT	---	---	---	---	---	---	(3242)
SERVICES, UTILITIES, MISC	512	559	524	656	729	633	437
SLUDGE POND	564	625	549	---	78	---	65
TOTAL DIRECT INVESTMENT	9615	10496	9814	11588	12961	11186	7784
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	865	945	883	1043	1166	1007	701
CONSTRUCTION EXPENSE	1538	1679	1570	1854	2074	1790	1245
CONTRACTOR FEES	481	525	491	579	648	559	389
CONTINGENCY	2500	2729	2552	3013	3370	3635	2602
ALLOWANCE FOR SHAKEDOWN	1444	1575	1476	1808	2014	1745	1208
INTEREST DURING CONSTRUCTION	2496	2725	2547	3008	3364	2904	2020
LAND	37	42	37	22	22	22	72
WORKING CAPITAL	78	75	64	95	213	66	57
TOTAL CAPITAL INVESTMENT	19055	20791	19434	23009	25832	22913	16078

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE G-1.222 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-4

PLANT SIZE: 100 MW

COAL: 1.00 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LINE SPRAY DRYER
OPERATING COST							
(VARIABLE)							
RAW MATERIAL							
-LIME	322	---	307	---	---	---	355
-LIMESTONE	---	274	---	90	---	---	---
-SODA ASH	---	---	30	---	1380	121	---
-MAGNESIUM OXIDE	---	---	---	21	---	---	---
-COAL	---	---	---	---	---	53	---
-CATALYST	---	---	---	0	---	1	---
UTILITIES							
-ELECTRICITY	366	392	186	377	357	505	333
-WATER	6	6	7	31	120	65	2
-STEAM	250	230	250	257	806	---	---
-FUEL OIL	---	---	---	409	---	163	---
-NATURAL GAS	---	---	---	---	9	---	---
-HEAT CREDIT	---	---	---	(20)	(0)	(46)	---
TOTAL VARIABLE O&M COST	944	901	780	1165	2672	861	690
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	79
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	121	121	173	229	227	247	121
MAINTENANCE							
-LABOR & MATERIAL	906	989	565	1023	1140	982	607
TOTAL FIXED O&M COST	1028	1110	738	1253	1367	1229	807
OVERHEAD							
-PLANT	514	555	369	626	683	614	404
-ADMINISTRATIVE	12	12	17	23	23	25	12
-MARKETING	---	---	---	28	2	20	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(276)	---	---	---
-SULFUR	---	---	---	---	(23)	(202)	---
NET OPERATING COST	2498	2578	1903	2819	4725	2547	1913
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	5.17	5.64	5.27	6.24	7.00	6.21	4.36
-LEVELIZED OPERATING COST (MILL/KWH)	5.81	5.99	4.42	6.55	10.98	5.92	4.45
TOTAL LEVELIZED COST (MILL/KWH)	10.97	11.63	9.69	12.79	17.99	12.13	8.81

TABLE G-1.223 TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT

REGION: WSCC-4

PLANT SIZE: 100 MW

COAL: 0.55 % SULFUR

	LINE	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
DIRECT INVESTMENT							
MATERIALS HANDLING/PREPARATION	348	737	311	163	130	150	390
GAS HANDLING	2263	2250	2274	2477	2516	2689	2625
CHLORIDE PURGE	---	---	---	1540	803	---	---
SO2 ABSORPTION	4364	4602	4350	2578	3959	4524	7130
STACK GAS REHEAT	584	613	613	552	540	---	---
REGENERATION	---	---	60	1629	1831	1774	---
SLUDGE DISPOSAL	678	709	686	---	---	---	150
SULFURIC ACID PRODUCTION/STORAGE	---	---	---	848	---	---	---
SULFUR PRODUCTION/STORAGE	---	---	---	---	1043	419	---
ESP CREDIT	---	---	---	---	---	---	(3250)
SERVICES, UTILITIES, MISC	494	535	498	587	649	573	423
SLUDGE POND	360	397	355	---	78	---	65
TOTAL DIRECT INVESTMENT	9092	9841	9146	10374	11550	10129	7533
INDIRECT INVESTMENT							
ARCHITECT & ENGINEERING DESIGN/ SUPV. & CONTRACTOR EXPENSES	818	886	823	934	1039	912	678
CONSTRUCTION EXPENSE	1455	1575	1463	1660	1848	1621	1205
CONTRACTOR FEES	455	492	457	519	577	506	377
CONTINGENCY	2364	2559	2378	2697	3003	3292	2455
ALLOWANCE FOR SHAKEDOWN	1382	1496	1391	1618	1794	1580	1169
INTEREST DURING CONSTRUCTION	2360	2555	2374	2693	2998	2629	1955
LAND	27	29	27	22	22	22	66
WORKING CAPITAL	66	64	51	78	208	56	44
TOTAL CAPITAL INVESTMENT	18019	19496	18111	20594	23039	20747	15483

NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST INCLUDES THE ESP CREDIT.

TABLE 6-1.224 ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS

RUN1.0015/13/81

APPLICATION: RETROFIT		REGION: WSCC-4		PLANT SIZE: 100 MW		COAL: 0.55 % SULFUR	
	LIME	LIMESTONE	DUAL ALKALI	MAGNESIA SLURRY	WELLMAN- LORD	AQUEOUS CARBONATE	LIME SPRAY DRYER
OPERATING COST	-----	-----	-----	-----	-----	-----	-----
(VARIABLE)							
RAW MATERIAL							
-LIME	177	---	169	---	---	---	195
-LIMESTONE	---	150	---	90	---	---	---
-SODA ASH	---	---	16	---	1352	66	---
-MAGNESIUM OXIDE	---	---	---	11	---	---	---
-COAL	---	---	---	---	---	29	---
-CATALYST	---	---	---	0	---	0	---
UTILITIES							
-ELECTRICITY	366	389	182	362	357	506	334
-WATER	6	6	7	23	113	61	2
-STEAM	251	228	251	258	808	---	---
-FUEL OIL	---	---	---	225	---	90	---
-NATURAL GAS	---	---	---	---	-26	---	---
-HEAT CREDIT	---	---	---	(11)	(-1)	(25)	---
TOTAL VARIABLE O&M COST	799	773	624	959	2606	728	531
(FIXED)							
WASTE DISPOSAL (TRUCKING)	---	---	---	---	---	---	71
LABOR							
-OPERATING, ANALYSIS, SUPERVISION	111	111	159	210	207	225	111
MAINTENANCE							
-LABOR & MATERIAL	869	940	531	916	1015	889	588
TOTAL FIXED O&M COST	980	1051	690	1126	1223	1115	769
OVERHEAD							
-PLANT	490	525	345	563	611	557	385
-ADMINISTRATIVE	11	11	16	21	21	23	11
-MARKETING	---	---	---	15	-6	11	---
BYPRODUCT SALES							
-SULFURIC ACID	---	---	---	(152)	---	---	---
-SULFUR	---	---	---	---	(-65)	(111)	---
NET OPERATING COST	2280	2360	1676	2532	4519	2322	1697
LEVELIZED - 20 YEARS							
-LEVELIZED CAPITAL COST (MILL/KWH)	4.89	5.29	4.91	5.58	6.25	5.62	4.20
-LEVELIZED OPERATING COST (MILL/KWH)	5.30	5.49	3.89	5.89	10.50	5.40	3.94
TOTAL LEVELIZED COST (MILL/KWH)	10.18	10.77	8.81	11.47	16.75	11.02	8.14

APPENDIX H
SENSITIVITY ANALYSIS

APPENDIX H

FGD Systems Ranked By Levelized Cost - Base Case and Sensitivity Analysis

Table H-1. New, 500 MW Systems

Table H-2. New, 100 MW Systems

Table H-3. Retrofit, 500 MW Systems

Table H-4. Retrofit, 100 MW Systems

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : BASE CASE ANALYSIS

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/10.36	WL/11.56	MGO/11.78
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.75	MGO/ 9.45	WL/12.30
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.49	MGO/ 6.98	WL/ 9.08
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/10.61	WL/11.93	MGO/12.84
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.53	MGO/10.32	WL/13.38
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/10.68	WL/12.54	MGO/12.64
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.63	MGO/ 7.17	WL/ 9.25
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.35	AC/10.51	MGO/11.18	WL/12.29
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.70	AC/10.90	MGO/12.82	WL/13.33
SPP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 9.88	DA/10.18	MGO/10.71	WL/11.90
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.48	MGO/ 8.26	WL/10.43
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.28	MGO/ 9.41	WL/11.24
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.89	MGO/ 8.80	WL/10.85
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.58	MGO/ 8.43	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.60	MGO/ 8.33	WL/10.11
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.96	MGO/ 9.90	WL/12.27
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.26	MGO/ 7.91	WL/ 9.80
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.81	MGO/ 8.73	WL/10.35
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.67	MGO/ 9.73	WL/11.86
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.20	MGO/ 9.10	WL/11.06
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.36	MGO/ 8.00	WL/ 9.86
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.62	MGO/ 8.19	WL/10.29
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.35	MGO/ 9.21	WL/11.49
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.76	MGO/ 8.39	WL/10.61
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.20	MGO/ 9.31	WL/11.14
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.70	MGO/ 8.54	WL/10.72
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.22	MGO/ 7.90	WL/10.21
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 7.02	MGO/ 7.70	WL/ 9.98

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LINE COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	8.70	8.96		*LSD/ 6.75	DA/ 8.27	AC/10.36	WL/11.56	MGO/11.66
ERCOT	80%	8.09	8.55		*LSD/ 6.02	DA/ 6.92	AC/ 8.75	MGO/ 9.34	WL/12.30
MAAC	80%	5.80	6.10		*LSD/ 4.30	DA/ 5.00	AC/ 6.49	MGO/ 6.89	WL/ 9.08
MAIN	90%	8.36	8.92		*LSD/ 6.38	DA/ 7.93	AC/10.61	WL/11.93	MGO/12.75
MARCA-1	80%	8.85	9.43		*LSD/ 6.60	DA/ 7.56	AC/ 9.53	MGO/10.21	WL/13.38
MARCA-2	90%	9.17	10.66		*LSD/ 7.11	DA/ 8.66	AC/10.68	MGO/12.52	WL/12.54
NPCC	80%	5.97	6.30		*LSD/ 4.45	DA/ 5.16	AC/ 6.63	MGO/ 7.03	WL/ 9.25
SERC	90%	9.08	8.75		*LSD/ 7.12	DA/ 8.63	AC/10.51	MGO/11.05	WL/12.29
SPP-1	90%	9.72	10.35		*LSD/ 7.55	DA/ 9.11	AC/10.90	MGO/12.70	WL/13.33
SPP-2	90%	8.85	9.15		*LSD/ 6.96	DA/ 8.43	AC/ 9.88	MGO/10.58	WL/11.90
WSCC-1	80%	6.91	7.46		*LSD/ 5.15	DA/ 5.93	AC/ 7.48	MGO/ 8.11	WL/10.43
WSCC-2	70%	7.47	8.04		LSD/ 5.55	DA/ 6.54	AC/ 8.28	MGO/ 9.29	WL/11.24
WSCC-3	70%	7.03	7.98		LSD/ 5.21	DA/ 6.19	AC/ 7.89	MGO/ 8.69	WL/10.85
WSCC-4	70%	6.75	7.42		LSD/ 5.00	DA/ 5.95	AC/ 7.58	MGO/ 8.31	WL/10.47
LOW SULFUR COAL									
ECAR	70%	6.70	7.02		LSD/ 4.98	DA/ 5.91	AC/ 7.60	MGO/ 8.22	WL/10.11
ERCOT	70%	8.12	8.68		LSD/ 6.05	DA/ 7.10	AC/ 8.96	MGO/ 9.79	WL/12.27
MAAC	70%	6.30	6.65		LSD/ 4.67	DA/ 5.58	AC/ 7.26	MGO/ 7.81	WL/ 9.80
MAIN	70%	6.75	7.15		LSD/ 4.99	DA/ 5.94	AC/ 7.81	MGO/ 8.64	WL/10.35
MARCA-1	70%	7.85	8.56		LSD/ 5.82	DA/ 6.85	AC/ 8.67	MGO/ 9.62	WL/11.86
MARCA-2	70%	7.34	8.00		LSD/ 5.47	DA/ 6.44	AC/ 8.20	MGO/ 8.99	WL/11.06
NPCC	70%	6.50	6.90		LSD/ 4.86	DA/ 5.76	AC/ 7.36	MGO/ 7.86	WL/ 9.86
SERC	70%	6.78	6.94		LSD/ 5.05	DA/ 5.99	AC/ 7.62	MGO/ 8.06	WL/10.29
SPP-1	70%	7.60	8.03		LSD/ 5.64	DA/ 6.63	AC/ 8.35	MGO/ 9.09	WL/11.49
SPP-2	70%	7.03	7.37		LSD/ 5.23	DA/ 6.19	AC/ 7.76	MGO/ 8.25	WL/10.61
WSCC-1	70%	7.54	8.40		LSD/ 5.66	DA/ 6.62	AC/ 8.20	MGO/ 9.16	WL/11.14
WSCC-2	70%	7.06	7.52		LSD/ 5.21	DA/ 6.07	AC/ 7.70	MGO/ 8.42	WL/10.72
WSCC-3	70%	6.59	7.20		LSD/ 4.85	DA/ 5.67	AC/ 7.22	MGO/ 7.79	WL/10.21
WSCC-4	70%	6.37	6.88		LSD/ 4.69	DA/ 5.51	AC/ 7.02	MGO/ 7.59	WL/ 9.98

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - Limestone Cost -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)					
					1	2	3	4	5	
HIGH SULFUR COAL										
ECAR	90%	10.26	8.34	*LSD/	8.47	DA/	9.76	AC/10.36	WL/11.56	MGO/11.78
ERCOT	80%	8.26	8.45	*LSD/	6.21	DA/	7.09	AC/ 8.75	MGO/ 9.45	WL/12.30
MAAC	80%	5.95	6.03	*LSD/	4.47	DA/	5.15	AC/ 6.49	MGO/ 6.98	WL/ 9.08
MAIN	90%	9.61	8.30	*LSD/	7.76	DA/	9.13	AC/10.61	WL/11.93	MGO/12.84
MARCA-1	80%	9.01	9.29	*LSD/	6.78	DA/	7.71	AC/ 9.53	MGO/10.32	WL/13.38
MARCA-2	90%	10.77	9.42	*LSD/	8.87	DA/	10.18	AC/10.68	WL/12.54	MGO/12.64
NPCC	80%	6.19	6.19	*LSD/	4.69	DA/	5.36	AC/ 6.63	MGO/ 7.17	WL/ 9.25
SERC	90%	10.89	8.30	*LSD/	9.11	DA/	10.35	AC/10.51	MGO/11.18	WL/12.29
SPP-1	90%	11.38	9.50	*LSD/	9.38	DA/	10.70	AC/10.90	MGO/12.82	WL/13.33
SPP-2	90%	10.69	8.36	*LSD/	8.98	AC/	9.88	DA/10.18	MGO/10.71	WL/11.90
WSCC-1	80%	7.15	7.25	*LSD/	5.42	DA/	6.16	AC/ 7.48	MGO/ 8.26	WL/10.43
WSCC-2	70%	7.89	7.76	LSD/	6.01	DA/	6.94	AC/ 8.28	MGO/ 9.41	WL/11.24
WSCC-3	70%	7.42	7.51	LSD/	5.64	DA/	6.56	AC/ 7.89	MGO/ 8.80	WL/10.85
WSCC-4	70%	7.15	7.08	LSD/	5.44	DA/	6.33	AC/ 7.58	MGO/ 8.33	WL/10.47
LOW SULFUR COAL										
ECAR	70%	7.10	6.86	LSD/	5.42	DA/	6.29	AC/ 7.60	MGO/ 8.33	WL/10.11
ERCOT	70%	8.53	8.43	LSD/	6.49	DA/	7.49	AC/ 8.96	MGO/ 9.90	WL/12.27
MAAC	70%	6.65	6.50	LSD/	5.05	DA/	5.91	AC/ 7.26	MGO/ 7.91	WL/ 9.80
MAIN	70%	7.08	6.99	LSD/	5.35	DA/	6.25	AC/ 7.81	MGO/ 8.73	WL/10.35
MARCA-1	70%	8.21	8.25	LSD/	6.22	DA/	7.19	AC/ 8.67	MGO/ 9.73	WL/11.86
MARCA-2	70%	7.75	7.68	LSD/	5.92	DA/	6.83	AC/ 8.20	MGO/ 9.10	WL/11.06
NPCC	70%	7.00	6.64	LSD/	5.41	DA/	6.23	AC/ 7.36	MGO/ 8.00	WL/ 9.86
SERC	70%	7.26	6.83	LSD/	5.57	DA/	6.44	AC/ 7.62	MGO/ 8.19	WL/10.29
SPP-1	70%	7.97	7.84	LSD/	6.06	DA/	6.98	AC/ 8.35	MGO/ 9.21	WL/11.49
SPP-2	70%	7.49	7.17	LSD/	5.74	DA/	6.63	AC/ 7.76	MGO/ 8.39	WL/10.61
WSCC-1	70%	8.09	7.91	LSD/	6.26	DA/	7.14	AC/ 8.20	MGO/ 9.31	WL/11.14
WSCC-2	70%	7.28	7.37	LSD/	5.45	DA/	6.28	AC/ 7.70	MGO/ 8.54	WL/10.72
WSCC-3	70%	6.77	6.98	LSD/	5.06	DA/	5.84	AC/ 7.22	MGO/ 7.90	WL/10.21
WSCC-4	70%	6.59	6.69	LSD/	4.93	DA/	5.72	AC/ 7.02	MGO/ 7.70	WL/ 9.98

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SODA ASH COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.64	AC/ 9.90	WL/11.24	MGO/11.78
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.07	AC/ 8.70	MGO/ 9.45	WL/12.00
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.13	AC/ 6.44	MGO/ 6.98	WL/ 8.76
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.03	AC/10.19	WL/11.64	MGO/12.84
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.70	AC/ 9.49	MGO/10.32	WL/13.10
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.08	AC/10.26	WL/12.24	MGO/12.64
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.35	AC/ 6.57	MGO/ 7.17	WL/ 8.91
SERC	90%	10.89	8.75		*LSD/ 9.11	AC/10.01	DA/10.22	MGO/11.18	WL/11.94
SPP-1	90%	11.38	10.35		*LSD/ 9.38	AC/10.44	DA/10.59	MGO/12.82	WL/13.01
SPP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 9.41	DA/10.06	MGO/10.71	WL/11.57
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.15	AC/ 7.43	MGO/ 8.26	WL/10.16
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.91	AC/ 8.18	MGO/ 9.41	WL/10.97
WSCC-3	70%	7.42	7.98		LSD/ 5.44	DA/ 6.53	AC/ 7.76	MGO/ 8.80	WL/10.50
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.30	AC/ 7.43	MGO/ 8.43	WL/10.07
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.26	AC/ 7.48	MGO/ 8.33	WL/ 9.81
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.46	AC/ 8.84	MGO/ 9.90	WL/11.97
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.87	AC/ 7.13	MGO/ 7.91	WL/ 9.46
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.22	AC/ 7.70	MGO/ 8.73	WL/10.06
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.17	AC/ 8.56	MGO/ 9.73	WL/11.57
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.81	AC/ 8.09	MGO/ 9.10	WL/10.77
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.20	AC/ 7.23	MGO/ 8.00	WL/ 9.51
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.41	AC/ 7.49	MGO/ 8.19	WL/ 9.96
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.96	AC/ 8.25	MGO/ 9.21	WL/11.19
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.60	AC/ 7.64	MGO/ 8.39	WL/10.30
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.11	AC/ 8.10	MGO/ 9.31	WL/10.87
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.27	AC/ 7.65	MGO/ 8.54	WL/10.45
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.83	AC/ 7.16	MGO/ 7.90	WL/ 9.88
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.70	AC/ 6.94	MGO/ 7.70	WL/ 9.59

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - MGO COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/10.36	WL/11.56	MGO/11.65
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.75	MGO/ 9.44	WL/12.30
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.49	MGO/ 6.97	WL/ 9.08
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/10.61	WL/11.93	MGO/12.72
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.53	MGO/10.30	WL/13.38
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/10.68	MGO/12.52	WL/12.54
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.63	MGO/ 7.15	WL/ 9.25
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.35	AC/10.51	MGO/11.06	WL/12.29
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.70	AC/10.90	MGO/12.71	WL/13.33
SPP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 9.88	DA/10.18	MGO/10.59	WL/11.90
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.48	MGO/ 8.25	WL/10.43
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.28	MGO/ 9.38	WL/11.24
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.89	MGO/ 8.77	WL/10.85
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.58	MGO/ 8.40	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.60	MGO/ 8.30	WL/10.11
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.96	MGO/ 9.87	WL/12.27
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.26	MGO/ 7.88	WL/ 9.80
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.81	MGO/ 8.70	WL/10.35
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.67	MGO/ 9.70	WL/11.86
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.20	MGO/ 9.07	WL/11.06
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.36	MGO/ 7.97	WL/ 9.86
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.62	MGO/ 8.16	WL/10.29
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.35	MGO/ 9.19	WL/11.49
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.76	MGO/ 8.36	WL/10.61
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.20	MGO/ 9.29	WL/11.14
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.70	MGO/ 8.52	WL/10.72
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.22	MGO/ 7.89	WL/10.21
WSCC-4	70%	6.59	5.88		LSD/ 4.93	DA/ 5.72	AC/ 7.02	MGO/ 7.69	WL/ 9.98

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - FUEL OIL COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	AC/ 9.61	DA/ 9.76	MGO/ 9.87	WL/11.56
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.66	MGO/ 9.23	WL/12.30
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.41	MGO/ 6.78	WL/ 9.08
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/ 9.62	MGO/10.35	WL/11.93
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.44	MGO/10.07	WL/13.38
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	AC/ 9.83	DA/10.18	MGO/10.50	WL/12.54
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.55	MGO/ 6.97	WL/ 9.25
SERC	90%	10.89	8.75		*LSD/ 9.11	MGO/ 9.70	AC/ 9.92	DA/10.35	WL/12.29
SPP-1	90%	11.38	10.35		*LSD/ 9.38	AC/10.14	DA/10.70	MGO/10.91	WL/13.33
SPP-2	90%	10.69	9.15		*LSD/ 8.98	MGO/ 9.32	AC/ 9.33	DA/10.18	WL/11.90
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.38	MGO/ 8.01	WL/10.43
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.04	MGO/ 8.79	WL/11.24
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.68	MGO/ 8.25	WL/10.85
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.38	MGO/ 7.92	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.40	MGO/ 7.84	WL/10.11
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.75	MGO/ 9.39	WL/12.27
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.07	MGO/ 7.43	WL/ 9.80
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.55	MGO/ 8.08	WL/10.35
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.45	MGO/ 9.17	WL/11.86
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 7.99	MGO/ 8.55	WL/11.06
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.18	MGO/ 7.55	WL/ 9.86
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.47	MGO/ 7.81	WL/10.29
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.18	MGO/ 8.78	WL/11.49
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.62	MGO/ 8.03	WL/10.61
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 7.97	MGO/ 8.74	WL/11.14
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.57	MGO/ 8.21	WL/10.72
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.12	MGO/ 7.64	WL/10.21
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 6.91	MGO/ 7.42	WL/ 9.98

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - NAT. GAS COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST(MILLS/KWH)					
					1	2	3	4	5	
HIGH SULFUR COAL										
ECAR	90%	10.26	8.96	*LSD/	8.47	DA/	9.76	AC/10.36	WL/11.40	MGO/11.78
ERCOT	80%	8.26	8.55	*LSD/	6.21	DA/	7.09	AC/ 8.75	MGO/ 9.45	WL/12.28
MAAC	80%	5.95	6.10	*LSD/	4.47	DA/	5.15	AC/ 6.49	MGO/ 6.98	WL/ 9.06
MAIN	90%	9.61	8.92	*LSD/	7.76	DA/	9.13	AC/10.61	WL/11.52	MGO/12.84
MARCA-1	80%	9.01	9.43	*LSD/	6.78	DA/	7.71	AC/ 9.53	MGO/10.32	WL/13.36
MARCA-2	90%	10.77	10.66	*LSD/	8.87	DA/	10.18	AC/10.68	WL/12.14	MGO/12.64
NPCC	80%	6.19	6.30	*LSD/	4.69	DA/	5.36	AC/ 6.63	MGO/ 7.17	WL/ 9.22
SERC	90%	10.89	8.75	*LSD/	9.11	DA/	10.35	AC/10.51	MGO/11.18	WL/11.94
SPP-1	90%	11.38	10.35	*LSD/	9.38	DA/	10.70	AC/10.90	MGO/12.82	WL/13.00
SPP-2	90%	10.69	9.15	*LSD/	8.98	AC/	9.88	DA/10.18	MGO/10.71	WL/11.53
WSCC-1	80%	7.15	7.46	*LSD/	5.42	DA/	6.16	AC/ 7.48	MGO/ 8.26	WL/10.40
WSCC-2	70%	7.89	8.04	LSD/	6.01	DA/	6.94	AC/ 8.28	MGO/ 9.41	WL/11.15
WSCC-3	70%	7.42	7.98	LSD/	5.64	DA/	6.56	AC/ 7.89	MGO/ 8.80	WL/10.73
WSCC-4	70%	7.15	7.42	LSD/	5.44	DA/	6.33	AC/ 7.58	MGO/ 8.43	WL/10.39
LOW SULFUR COAL										
ECAR	70%	7.10	7.02	LSD/	5.42	DA/	6.29	AC/ 7.60	MGO/ 8.33	WL/10.08
ERCOT	70%	8.53	8.68	LSD/	6.49	DA/	7.49	AC/ 8.96	MGO/ 9.90	WL/12.20
MAAC	70%	6.65	6.65	LSD/	5.05	DA/	5.91	AC/ 7.26	MGO/ 7.91	WL/ 9.70
MAIN	70%	7.08	7.15	LSD/	5.35	DA/	6.25	AC/ 7.81	MGO/ 8.73	WL/10.26
MARCA-1	70%	8.21	8.56	LSD/	6.22	DA/	7.19	AC/ 8.67	MGO/ 9.73	WL/11.81
MARCA-2	70%	7.75	8.00	LSD/	5.92	DA/	6.83	AC/ 8.20	MGO/ 9.10	WL/10.97
NPCC	70%	7.00	6.90	LSD/	5.41	DA/	6.23	AC/ 7.36	MGO/ 8.00	WL/ 9.77
SERC	70%	7.26	6.94	LSD/	5.57	DA/	6.44	AC/ 7.62	MGO/ 8.19	WL/10.22
SPP-1	70%	7.97	8.03	LSD/	6.06	DA/	6.98	AC/ 8.35	MGO/ 9.21	WL/11.43
SPP-2	70%	7.49	7.37	LSD/	5.74	DA/	6.63	AC/ 7.76	MGO/ 8.39	WL/10.53
WSCC-1	70%	8.09	8.40	LSD/	6.26	DA/	7.14	AC/ 8.20	MGO/ 9.31	WL/11.07
WSCC-2	70%	7.28	7.52	LSD/	5.45	DA/	6.28	AC/ 7.70	MGO/ 8.54	WL/10.68
WSCC-3	70%	6.77	7.20	LSD/	5.06	DA/	5.84	AC/ 7.22	MGO/ 7.90	WL/10.17
WSCC-4	70%	6.59	6.88	LSD/	4.93	DA/	5.72	AC/ 7.02	MGO/ 7.70	WL/ 9.94

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/11.26	HGO/11.78	WL/12.41
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.85	HGO/ 9.45	WL/12.35
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.59	HGO/ 6.98	WL/ 9.14
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/11.50	WL/12.77	HGO/12.84
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.63	HGO/10.32	WL/13.43
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/11.58	HGO/12.64	WL/13.39
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.73	HGO/ 7.17	WL/ 9.31
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.35	HGO/11.18	AC/11.40	WL/13.13
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.70	AC/11.79	HGO/12.82	WL/14.17
SPP-2	90%	10.69	9.15		*LSD/ 8.98	DA/10.18	HGO/10.71	AC/10.78	WL/12.75
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.58	HGO/ 8.26	WL/10.48
WSCC-2	70%	7.89	8.04		LSD/ 5.01	DA/ 6.94	AC/ 8.51	HGO/ 9.41	WL/11.41
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 8.12	HGO/ 8.80	WL/11.03
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.80	HGO/ 8.43	WL/10.65
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.83	HGO/ 8.33	WL/10.30
ERCOT	70%	8.53	8.68		LSD/ 4.49	DA/ 7.49	AC/ 9.19	HGO/ 9.90	WL/12.46
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.49	HGO/ 7.91	WL/ 9.98
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 8.04	HGO/ 8.73	WL/10.53
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.89	HGO/ 9.73	WL/12.03
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.43	HGO/ 9.10	WL/11.24
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.59	HGO/ 8.00	WL/10.04
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.86	HGO/ 8.19	WL/10.48
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.55	HGO/ 9.21	WL/11.65
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.99	HGO/ 8.39	WL/10.79
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.43	HGO/ 9.31	WL/11.32
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.82	HGO/ 8.54	WL/10.79
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.33	HGO/ 7.90	WL/10.28
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 7.15	HGO/ 7.70	WL/10.06

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/10.36	WL/11.56	MGO/13.00
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.75	MGO/ 9.58	WL/12.30
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.49	MGO/ 7.12	WL/ 9.08
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/10.61	WL/11.93	MGO/14.06
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.53	MGO/10.45	WL/13.38
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/10.68	WL/12.54	MGO/13.86
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.63	MGO/ 7.30	WL/ 9.25
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.35	AC/10.51	WL/12.29	MGO/12.40
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.70	AC/10.90	WL/13.33	MGO/14.04
SPP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 9.88	DA/10.18	WL/11.90	MGO/11.93
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.48	MGO/ 8.40	WL/10.43
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.28	MGO/ 9.71	WL/11.24
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.89	MGO/ 9.11	WL/10.85
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.58	MGO/ 8.73	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.60	MGO/ 8.65	WL/10.11
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.96	MGO/10.22	WL/12.27
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.26	MGO/ 8.22	WL/ 9.80
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.81	MGO/ 9.05	WL/10.35
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.67	MGO/10.03	WL/11.86
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.20	MGO/ 9.42	WL/11.06
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.36	MGO/ 8.31	WL/ 9.86
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.62	MGO/ 8.51	WL/10.29
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.35	MGO/ 9.49	WL/11.49
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.76	MGO/ 8.69	WL/10.61
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.20	MGO/ 9.62	WL/11.14
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.70	MGO/ 8.70	WL/10.72
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.22	MGO/ 8.05	WL/10.21
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 7.02	MGO/ 7.87	WL/ 9.98

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SO2 ABSORPTION UNIT COST -50X

APPLICATION: NEW					PLANT SIZE: 500 MW				
REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	9.13	7.78		*LSD/ 6.74	DA/ 8.77	AC/ 9.13	WL/10.50	MGO/11.09
ERCOT	80%	6.70	6.91		*LSD/ 3.86	DA/ 5.69	AC/ 7.01	MGO/ 8.47	WL/10.80
MAAC	80%	4.87	4.96		*LSD/ 2.83	DA/ 4.20	AC/ 5.32	MGO/ 6.32	WL/ 8.07
MAIN	90%	8.50	7.74		*LSD/ 6.06	DA/ 8.15	AC/ 9.39	WL/10.89	MGO/12.16
MARCA-1	80%	7.29	7.61		*LSD/ 4.19	DA/ 6.16	AC/ 7.60	MGO/ 9.23	WL/11.72
MARCA-2	90%	9.56	9.39		*LSD/ 7.03	DA/ 9.12	AC/ 9.36	WL/11.40	MGO/11.89
NPCC	80%	5.09	5.14		*LSD/ 3.02	DA/ 4.40	AC/ 5.43	MGO/ 6.49	WL/ 8.22
SERC	90%	9.72	7.51		*LSD/ 7.32	AC/ 9.23	DA/ 9.32	MGO/10.46	WL/11.19
SPP-1	90%	10.04	8.93		*LSD/ 7.34	AC/ 9.42	DA/ 9.51	MGO/11.99	WL/12.06
SPP-2	90%	9.58	7.98		*LSD/ 7.28	AC/ 8.67	DA/ 9.21	MGO/10.03	WL/10.86
WSCC-1	80%	5.85	6.09		*LSD/ 3.46	DA/ 5.01	AC/ 6.04	MGO/ 7.46	WL/ 9.19
WSCC-2	70%	6.56	6.64		LSD/ 4.01	DA/ 5.76	AC/ 6.82	MGO/ 8.59	WL/ 9.98
WSCC-3	70%	6.18	6.67		LSD/ 3.78	DA/ 5.47	AC/ 6.54	MGO/ 8.04	WL/ 9.68
WSCC-4	70%	5.97	6.18		LSD/ 3.67	DA/ 5.30	AC/ 6.29	MGO/ 7.70	WL/ 9.36
LOW SULFUR COAL									
ECAR	70%	5.94	5.79		LSD/ 3.66	DA/ 5.27	AC/ 6.33	MGO/ 7.62	WL/ 9.02
ERCOT	70%	7.06	7.13		LSD/ 4.29	DA/ 6.18	AC/ 7.33	MGO/ 8.99	WL/10.87
MAAC	70%	5.56	5.51		LSD/ 3.41	DA/ 4.95	AC/ 6.07	MGO/ 7.24	WL/ 8.78
MAIN	70%	5.89	5.90		LSD/ 3.56	DA/ 5.21	AC/ 6.50	MGO/ 8.00	WL/ 9.23
MARCA-1	70%	6.79	7.05		LSD/ 4.08	DA/ 5.93	AC/ 7.09	MGO/ 8.84	WL/10.50
MARCA-2	70%	6.46	6.63		LSD/ 3.98	DA/ 5.69	AC/ 6.78	MGO/ 8.30	WL/ 9.83
NPCC	70%	5.90	5.74		LSD/ 3.75	DA/ 5.27	AC/ 6.16	MGO/ 7.33	WL/ 8.83
SERC	70%	6.09	5.71		LSD/ 3.81	DA/ 5.41	AC/ 6.34	MGO/ 7.48	WL/ 9.19
SPP-1	70%	6.60	6.58		LSD/ 3.99	DA/ 5.76	AC/ 6.83	MGO/ 8.36	WL/10.19
SPP-2	70%	6.27	6.08		LSD/ 3.90	DA/ 5.55	AC/ 6.42	MGO/ 7.63	WL/ 9.46
WSCC-1	70%	6.77	7.01		LSD/ 4.28	DA/ 5.97	AC/ 6.75	MGO/ 8.50	WL/ 9.90
WSCC-2	70%	5.95	6.12		LSD/ 3.46	DA/ 5.10	AC/ 6.23	MGO/ 7.71	WL/ 9.45
WSCC-3	70%	5.53	5.89		LSD/ 3.19	DA/ 4.75	AC/ 5.86	MGO/ 7.14	WL/ 9.04
WSCC-4	70%	5.41	5.63		LSD/ 3.16	DA/ 4.68	AC/ 5.73	MGO/ 6.98	WL/ 8.86

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - REGENERATION UNIT COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	AC/ 9.30	DA/ 9.72	WL/10.48	MGO/10.81
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.08	AC/ 8.45	MGO/ 9.18	WL/11.99
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.14	AC/ 6.19	MGO/ 6.71	WL/ 8.78
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.10	AC/ 9.55	WL/10.86	MGO/11.89
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.70	AC/ 9.23	MGO/10.04	WL/13.07
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	AC/ 9.62	DA/10.15	WL/11.47	MGO/11.68
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.33	MGO/ 6.90	WL/ 8.94
SERC	90%	10.89	8.75		*LSD/ 9.11	AC/ 9.45	MGO/10.22	DA/10.31	WL/11.22
SPF-1	90%	11.38	10.35		*LSD/ 9.38	AC/ 9.84	DA/10.67	MGO/11.86	WL/12.26
SPF-2	90%	10.69	9.15		AC/ 8.82	*LSD/ 8.98	MGO/ 9.75	DA/10.15	WL/10.83
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.15	AC/ 7.17	MGO/ 7.99	WL/10.12
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.92	AC/ 7.80	MGO/ 8.97	WL/10.75
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.55	AC/ 7.41	MGO/ 8.36	WL/10.35
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.32	AC/ 7.10	MGO/ 7.99	WL/ 9.98
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.28	AC/ 7.11	MGO/ 7.89	WL/ 9.61
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.47	AC/ 8.47	MGO/ 9.46	WL/11.78
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.89	AC/ 6.77	MGO/ 7.47	WL/ 9.30
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.24	AC/ 7.31	MGO/ 8.29	WL/ 9.85
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.18	AC/ 8.19	MGO/ 9.29	WL/11.37
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.82	AC/ 7.72	MGO/ 8.66	WL/10.56
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.22	AC/ 6.87	MGO/ 7.56	WL/ 9.37
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.42	AC/ 7.13	MGO/ 7.75	WL/ 9.79
SPF-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.97	AC/ 7.90	MGO/ 8.80	WL/11.03
SPF-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.61	AC/ 7.28	MGO/ 7.95	WL/10.12
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.12	AC/ 7.72	MGO/ 8.87	WL/10.65
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.27	AC/ 7.37	MGO/ 8.24	WL/10.38
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.83	AC/ 6.90	MGO/ 7.61	WL/ 9.89
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.71	AC/ 6.68	MGO/ 7.39	WL/ 9.63

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR UNIT COST -50X

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/ 9.95	WL/10.55	MGO/11.78
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.66	MGO/ 9.45	WL/12.08
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.41	MGO/ 6.98	WL/ 8.87
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/10.20	WL/10.93	MGO/12.84
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.45	MGO/10.32	WL/13.16
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/10.27	WL/11.54	MGO/12.64
NFCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.54	MGO/ 7.17	WL/ 9.04
SERC	90%	10.89	8.75		*LSD/ 9.11	AC/10.10	DA/10.35	MGO/11.18	WL/11.29
SPP-1	90%	11.38	10.35		*LSD/ 9.38	AC/10.49	DA/10.70	WL/12.33	MGO/12.82
SPP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 9.47	DA/10.18	MGO/10.71	WL/10.90
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.39	MGO/ 8.26	WL/10.21
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.13	MGO/ 9.41	WL/10.85
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.74	MGO/ 8.80	WL/10.46
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.42	MGO/ 8.43	WL/10.09
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.44	MGO/ 8.33	WL/ 9.72
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.80	MGO/ 9.90	WL/11.88
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.10	MGO/ 7.91	WL/ 9.41
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.65	MGO/ 8.73	WL/ 9.96
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.52	MGO/ 9.73	WL/11.48
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.05	MGO/ 9.10	WL/10.67
NFCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.20	MGO/ 8.00	WL/ 9.48
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.46	MGO/ 8.19	WL/ 9.90
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.21	MGO/ 9.21	WL/11.14
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.60	MGO/ 8.39	WL/10.23
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.04	MGO/ 9.31	WL/10.76
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.60	MGO/ 8.54	WL/10.47
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.13	MGO/ 7.90	WL/ 9.98
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 6.92	MGO/ 7.70	WL/ 9.73

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID UNIT COST -50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/10.36	MGO/10.99	WL/11.56
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.75	MGO/ 9.28	WL/12.30
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.49	MGO/ 6.81	WL/ 9.08
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/10.61	WL/11.93	MGO/12.06
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.53	MGO/10.14	WL/13.38
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/10.68	MGO/11.86	WL/12.54
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.63	MGO/ 7.00	WL/ 9.25
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.35	MGO/10.40	AC/10.51	WL/12.29
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.70	AC/10.90	MGO/12.04	WL/13.33
SPP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 9.88	MGO/ 9.93	DA/10.18	WL/11.90
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.48	MGO/ 8.09	WL/10.43
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.28	MGO/ 9.11	WL/11.24
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.89	MGO/ 8.49	WL/10.85
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.58	MGO/ 8.13	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.60	MGO/ 8.02	WL/10.11
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.96	MGO/ 9.59	WL/12.27
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.26	MGO/ 7.60	WL/ 9.80
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.81	MGO/ 8.42	WL/10.35
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.67	MGO/ 9.43	WL/11.86
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.20	MGO/ 8.80	WL/11.06
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.36	MGO/ 7.70	WL/ 9.86
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.62	MGO/ 7.88	WL/10.29
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.35	MGO/ 8.93	WL/11.49
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.76	MGO/ 8.08	WL/10.61
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.20	MGO/ 9.01	WL/11.14
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.70	MGO/ 8.34	WL/10.72
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.22	MGO/ 7.72	WL/10.21
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 7.02	MGO/ 7.50	WL/ 9.98

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LIME COST +50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST(MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	11.82	8.96		*LSD/10.18	AC/10.36	DA/11.24	WL/11.56	MGO/11.89
ERCOT	80%	8.44	8.55		*LSD/ 6.40	DA/ 7.25	AC/ 8.75	MGO/ 9.56	WL/12.30
MAAC	80%	6.10	6.10		*LSD/ 4.63	DA/ 5.29	AC/ 6.49	MGO/ 7.08	WL/ 9.08
MAIN	90%	10.87	8.92		*LSD/ 9.15	DA/10.33	AC/10.61	WL/11.93	MGO/12.93
MARCA-1	80%	9.17	9.43		*LSD/ 6.96	DA/ 7.87	AC/ 9.53	MGO/10.42	WL/13.38
MARCA-2	90%	12.36	10.66		*LSD/10.63	AC/10.68	DA/11.70	WL/12.54	MGO/12.75
NPCC	80%	6.41	6.30		*LSD/ 4.93	DA/ 5.57	AC/ 6.63	MGO/ 7.31	WL/ 9.25
SERC	90%	12.70	8.75		AC/10.51	*LSD/11.10	MGO/11.31	DA/12.07	WL/12.29
SPP-1	90%	13.04	10.35		AC/10.90	*LSD/11.21	DA/12.28	MGO/12.94	WL/13.33
SPP-2	90%	12.53	9.15		AC/ 9.88	MGO/10.84	*LSD/11.00	WL/11.90	DA/11.93
WSCC-1	80%	7.39	7.46		*LSD/ 5.68	DA/ 6.39	AC/ 7.48	MGO/ 8.42	WL/10.43
WSCC-2	70%	8.30	8.04		LSD/ 6.47	DA/ 7.33	AC/ 8.28	MGO/ 9.53	WL/11.24
WSCC-3	70%	7.81	7.98		LSD/ 6.08	DA/ 6.93	AC/ 7.89	MGO/ 8.91	WL/10.85
WSCC-4	70%	7.55	7.42		LSD/ 5.88	DA/ 6.71	AC/ 7.58	MGO/ 8.54	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.50	7.02		LSD/ 5.86	DA/ 6.67	AC/ 7.60	MGO/ 8.44	WL/10.11
ERCOT	70%	8.94	8.68		LSD/ 6.94	DA/ 7.88	AC/ 8.96	MGO/10.01	WL/12.27
MAAC	70%	7.00	6.65		LSD/ 5.43	DA/ 6.24	AC/ 7.26	MGO/ 8.01	WL/ 9.80
MAIN	70%	7.40	7.15		LSD/ 5.70	DA/ 6.56	AC/ 7.81	MGO/ 8.82	WL/10.35
MARCA-1	70%	8.57	8.56		LSD/ 6.61	DA/ 7.54	AC/ 8.67	MGO/ 9.83	WL/11.86
MARCA-2	70%	8.16	8.00		LSD/ 6.37	DA/ 7.22	AC/ 8.20	MGO/ 9.22	WL/11.06
NPCC	70%	7.49	6.90		LSD/ 5.96	DA/ 6.70	AC/ 7.36	MGO/ 8.14	WL/ 9.86
SERC	70%	7.73	6.94		LSD/ 6.09	DA/ 6.89	AC/ 7.62	MGO/ 8.32	WL/10.29
SPP-1	70%	8.35	8.03		LSD/ 6.47	DA/ 7.34	AC/ 8.35	MGO/ 9.33	WL/11.49
SPP-2	70%	7.96	7.37		LSD/ 6.25	DA/ 7.07	AC/ 7.76	MGO/ 8.52	WL/10.61
WSCC-1	70%	8.63	8.40		LSD/ 6.86	DA/ 7.66	AC/ 8.20	MGO/ 9.47	WL/11.14
WSCC-2	70%	7.50	7.52		LSD/ 5.70	DA/ 6.49	AC/ 7.70	MGO/ 8.66	WL/10.72
WSCC-3	70%	6.96	7.20		LSD/ 5.26	DA/ 6.02	AC/ 7.22	MGO/ 8.01	WL/10.21
WSCC-4	70%	6.81	6.88		LSD/ 5.18	DA/ 5.93	AC/ 7.02	MGO/ 7.82	WL/ 9.98

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - Limestone cost +50%

APPLICATION: NEW					PLANT SIZE: 500 MW				
REGION	REMOVAL REQUIRED	LIME	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	9.59		*LSD/ 8.47	DA/ 9.76	AC/10.36	WL/11.56	MGO/11.78
ERCOT	80%	8.26	8.66		*LSD/ 6.21	DA/ 7.09	AC/ 8.75	MGO/ 9.45	WL/12.30
MAAC	80%	5.95	6.17		*LSD/ 4.47	DA/ 5.15	AC/ 6.49	MGO/ 6.98	WL/ 9.08
MAIN	90%	9.61	9.54		*LSD/ 7.76	DA/ 9.13	AC/10.61	WL/11.93	MGO/12.84
MARCA-1	80%	9.01	9.57		*LSD/ 6.78	DA/ 7.71	AC/ 9.53	MGO/10.32	WL/13.38
MARCA-2	90%	10.77	11.90		*LSD/ 8.87	DA/10.18	AC/10.68	WL/12.54	MGO/12.64
NPCC	80%	6.19	6.41		*LSD/ 4.69	DA/ 5.36	AC/ 6.63	MGO/ 7.17	WL/ 9.25
SERC	90%	10.89	9.20		*LSD/ 9.11	DA/10.35	AC/10.51	MGO/11.18	WL/12.29
SPP-1	90%	11.38	11.19		*LSD/ 9.38	DA/10.70	AC/10.90	MGO/12.82	WL/13.33
SPP-2	90%	10.69	9.94		*LSD/ 8.98	AC/ 9.88	DA/10.18	MGO/10.71	WL/11.90
WSCC-1	80%	7.15	7.68		*LSD/ 5.42	DA/ 6.16	AC/ 7.48	MGO/ 8.26	WL/10.43
WSCC-2	70%	7.89	8.33		LSD/ 6.01	DA/ 6.94	AC/ 8.28	MGO/ 9.41	WL/11.24
WSCC-3	70%	7.42	8.44		LSD/ 5.64	DA/ 6.56	AC/ 7.89	MGO/ 8.80	WL/10.85
WSCC-4	70%	7.15	7.76		LSD/ 5.44	DA/ 6.33	AC/ 7.58	MGO/ 8.43	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.18		LSD/ 5.42	DA/ 6.29	AC/ 7.60	MGO/ 8.33	WL/10.11
ERCOT	70%	8.53	8.93		LSD/ 6.49	DA/ 7.49	AC/ 8.96	MGO/ 9.90	WL/12.27
MAAC	70%	6.65	6.81		LSD/ 5.05	DA/ 5.91	AC/ 7.26	MGO/ 7.91	WL/ 9.80
MAIN	70%	7.08	7.31		LSD/ 5.35	DA/ 6.25	AC/ 7.81	MGO/ 8.73	WL/10.35
MARCA-1	70%	8.21	8.86		LSD/ 6.22	DA/ 7.19	AC/ 8.67	MGO/ 9.73	WL/11.86
MARCA-2	70%	7.75	8.32		LSD/ 5.92	DA/ 6.83	AC/ 8.20	MGO/ 9.10	WL/11.06
NPCC	70%	7.00	7.16		LSD/ 5.41	DA/ 6.23	AC/ 7.36	MGO/ 8.00	WL/ 9.86
SERC	70%	7.26	7.06		LSD/ 5.57	DA/ 6.44	AC/ 7.62	MGO/ 8.19	WL/10.29
SPP-1	70%	7.97	8.22		LSD/ 6.06	DA/ 6.98	AC/ 8.35	MGO/ 9.21	WL/11.49
SPP-2	70%	7.49	7.57		LSD/ 5.74	DA/ 6.63	AC/ 7.76	MGO/ 8.39	WL/10.61
WSCC-1	70%	8.09	8.88		LSD/ 6.26	DA/ 7.14	AC/ 8.20	MGO/ 9.31	WL/11.14
WSCC-2	70%	7.28	7.67		LSD/ 5.45	DA/ 6.28	AC/ 7.70	MGO/ 8.54	WL/10.72
WSCC-3	70%	6.77	7.42		LSD/ 5.06	DA/ 5.84	AC/ 7.22	MGO/ 7.90	WL/10.21
WSCC-4	70%	6.59	7.06		LSD/ 4.93	DA/ 5.72	AC/ 7.02	MGO/ 7.70	WL/ 9.98

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SODA ASH COST +50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.87	AC/10.83	MGO/11.78	WL/11.87
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.10	AC/ 8.80	MGO/ 9.45	WL/12.60
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.16	AC/ 6.55	MGO/ 6.98	WL / 9.41
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.23	AC/11.04	WL/12.22	MGO/12.84
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.73	AC/ 9.58	MGO/10.32	WL/13.66
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.29	AC/11.11	MGO/12.64	WL/12.84
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.38	AC/ 6.69	MGO/ 7.17	WL/ 9.59
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.47	AC/11.01	MGO/11.18	WL/12.64
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.81	AC/11.36	MGO/12.82	WL/13.64
SPP-2	90%	10.69	9.15		*LSD/ 8.98	DA/10.30	AC/10.36	MGO/10.71	WL/12.23
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.17	AC/ 7.52	MGO/ 8.26	WL/10.69
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.96	AC/ 8.39	MGO/ 9.41	WL/11.50
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.59	AC/ 8.03	MGO/ 8.80	WL/11.19
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.37	AC/ 7.73	MGO/ 8.43	WL/10.86
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.32	AC/ 7.72	MGO/ 8.33	WL/10.41
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.52	AC/ 9.08	MGO/ 9.90	WL/12.58
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.94	AC/ 7.39	MGO/ 7.91	WL/10.14
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.28	AC/ 7.92	MGO/ 8.73	WL/10.63
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.22	AC/ 8.78	MGO/ 9.73	WL/12.15
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.86	AC/ 8.31	MGO/ 9.10	WL/11.34
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.26	AC/ 7.49	MGO/ 8.00	WL/10.21
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.47	AC/ 7.75	MGO/ 8.19	WL/10.62
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 7.01	AC/ 8.45	MGO/ 9.21	WL/11.80
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.66	AC/ 7.88	MGO/ 8.39	WL/10.93
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.16	AC/ 8.30	MGO/ 9.31	WL/11.41
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.29	AC/ 7.76	MGO/ 8.54	WL/10.98
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.86	AC/ 7.29	MGO/ 7.90	WL/10.55
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.74	AC/ 7.11	MGO/ 7.70	WL/10.36

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - MGD COST +50%

APPLICATION: NEW					PLANT SIZE: 500 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/10.36	WL/11.56	MG0/11.90
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.75	MG0/ 9.46	WL/12.30
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.49	MG0/ 7.00	WL/ 9.08
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/10.61	WL/11.93	MG0/12.96
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.53	MG0/10.33	WL/13.38
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/10.68	WL/12.54	MG0/12.75
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.63	MG0/ 7.18	WL/ 9.25
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.35	AC/10.51	MG0/11.30	WL/12.29
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.70	AC/10.90	MG0/12.93	WL/13.33
SPP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 9.88	DA/10.18	MG0/10.82	WL/11.90
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.48	MG0/ 8.27	WL/10.43
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.28	MG0/ 9.43	WL/11.24
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.89	MG0/ 8.82	WL/10.85
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.58	MG0/ 8.45	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.60	MG0/ 8.36	WL/10.11
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.96	MG0/ 9.93	WL/12.27
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.26	MG0/ 7.94	WL/ 9.80
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.81	MG0/ 8.76	WL/10.35
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.67	MG0/ 9.75	WL/11.86
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.20	MG0/ 9.13	WL/11.06
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.36	MG0/ 8.03	WL/ 9.86
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.62	MG0/ 8.22	WL/10.29
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.35	MG0/ 9.24	WL/11.49
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.76	MG0/ 8.42	WL/10.61
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.20	MG0/ 9.34	WL/11.14
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.70	MG0/ 8.55	WL/10.72
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.22	MG0/ 7.91	WL/10.21
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 7.02	MG0/ 7.72	WL/ 9.98

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGD - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - FUEL OIL COST +50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/11.12	WL/11.56	MGO/13.68
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.84	MGO/ 9.67	WL/12.30
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.58	MGO/ 7.19	WL/ 9.08
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/11.60	WL/11.93	MGO/15.34
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.63	MGO/10.57	WL/13.38
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/11.54	WL/12.54	MGO/14.77
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.71	MGO/ 7.37	WL/ 9.25
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.35	AC/11.10	WL/12.29	MGO/12.66
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.70	AC/11.66	WL/13.33	MGO/14.73
SPP-2	90%	10.69	9.15		*LSD/ 8.98	DA/10.18	AC/10.44	WL/11.90	MGO/12.10
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.58	MGO/ 8.51	WL/10.43
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.53	MGO/10.03	WL/11.24
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 8.11	MGO/ 9.35	WL/10.85
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.78	MGO/ 8.94	WL/10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.79	MGO/ 8.82	WL/10.11
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 9.16	MGO/10.41	WL/12.27
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.45	MGO/ 8.39	WL/ 9.80
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 8.06	MGO/ 9.38	WL/10.35
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.89	MGO/10.28	WL/11.86
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.42	MGO/ 9.65	WL/11.06
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.54	MGO/ 8.46	WL/ 9.86
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.78	MGO/ 8.58	WL/10.29
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.52	MGO/ 9.64	WL/11.49
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.90	MGO/ 8.74	WL/10.61
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.43	MGO/ 9.88	WL/11.14
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.83	MGO/ 8.86	WL/10.72
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.33	MGO/ 8.16	WL/10.21
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 7.14	MGO/ 7.98	WL/ 9.98

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - NAT. GAS COST +50%

APPLICATION: NEW

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/10.36	WL/11.71	MGO/11.78
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.75	MGO/ 9.45	WL/12.32
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.49	MGO/ 6.98	WL/ 9.11
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/10.61	WL/12.34	MGO/12.84
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.53	MGO/10.32	WL/13.39
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/10.18	AC/10.68	MGO/12.64	WL/12.94
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.63	MGO/ 7.17	WL/ 9.28
SERC	90%	10.89	8.75		*LSD/ 9.11	DA/10.35	AC/10.51	MGO/11.18	WL/12.64
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/10.70	AC/10.90	MGO/12.82	WL/13.65
SPP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 9.88	DA/10.18	MGO/10.71	WL/12.27
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.48	MGO/ 8.26	WL/10.45
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.28	MGO/ 9.41	WL/11.32
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.89	MGO/ 8.80	WL/10.96
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.58	MGO/ 8.43	WL/10.55
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.60	MGO/ 8.33	WL/10.14
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.96	MGO/ 9.90	WL/12.35
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.26	MGO/ 7.91	WL/ 9.90
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.81	MGO/ 8.73	WL/10.44
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.67	MGO/ 9.73	WL/11.91
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.20	MGO/ 9.10	WL/11.14
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.36	MGO/ 8.00	WL/ 9.95
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.62	MGO/ 8.19	WL/10.37
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.35	MGO/ 9.21	WL/11.55
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.76	MGO/ 8.39	WL/10.69
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.20	MGO/ 9.31	WL/11.22
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.70	MGO/ 8.54	WL/10.75
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.22	MGO/ 7.90	WL/10.25
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 7.02	MGO/ 7.70	WL/10.01

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR COST +50%

APPLICATION: NEW					PLANT SIZE: 500 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST(MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSM/ 8.47	AC/ 9.46	DA/ 9.76	WL/10.71	MGO/11.78
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.65	MGO/ 9.45	WL/12.24
MAAC	80%	5.95	6.10		*LSE/ 4.47	DA/ 5.15	AC/ 6.40	MGO/ 6.98	WL/ 9.03
MAIN	90%	9.61	8.92		*LSE/ 7.76	DA/ 9.13	AC/ 9.72	WL/11.09	MGO/12.84
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.44	MGO/10.32	WL/13.32
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	AC/ 9.79	DA/10.18	WL/11.69	MGO/12.64
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.53	MGO/ 7.17	WL/ 9.20
SERC	90%	10.89	8.75		*LSD/ 9.11	AC/ 9.62	DA/10.35	MGO/11.18	WL/11.45
SFP-1	90%	11.38	10.35		*LSD/ 9.38	AC/10.01	DA/10.70	WL/12.49	MGO/12.82
SFP-2	90%	10.69	9.15		*LSD/ 8.98	AC/ 8.99	DA/10.18	MGO/10.71	WL/11.06
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.38	MGO/ 8.26	WL/10.37
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.06	MGO/ 9.41	WL/11.06
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.67	MGO/ 8.80	WL/10.66
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.36	MGO/ 8.43	WL/10.29
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.37	MGO/ 8.33	WL/ 9.92
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.73	MGO/ 9.90	WL/12.09
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.03	MGO/ 7.91	WL/ 9.61
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.57	MGO/ 8.73	WL/10.16
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.45	MGO/ 9.73	WL/11.68
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 7.97	MGO/ 9.10	WL/10.87
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.13	MGO/ 8.00	WL/ 9.68
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.39	MGO/ 8.19	WL/10.11
SFP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.15	MGO/ 9.21	WL/11.34
SFP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.54	MGO/ 8.39	WL/10.43
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 7.97	MGO/ 9.31	WL/10.96
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.59	MGO/ 8.54	WL/10.64
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.11	MGO/ 7.90	WL/10.15
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 6.90	MGO/ 7.70	WL/ 9.90

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-1. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID COST +50%

APPLICATION: NEW					PLANT SIZE: 500 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.26	8.96		*LSD/ 8.47	DA/ 9.76	AC/ 10.36	MGO/ 10.55	WL/ 11.56
ERCOT	80%	8.26	8.55		*LSD/ 6.21	DA/ 7.09	AC/ 8.75	MGO/ 9.31	WL/ 12.30
MAAC	80%	5.95	6.10		*LSD/ 4.47	DA/ 5.15	AC/ 6.49	MGO/ 6.85	WL/ 9.08
MAIN	90%	9.61	8.92		*LSD/ 7.76	DA/ 9.13	AC/ 10.61	MGO/ 11.62	WL/ 11.93
MARCA-1	80%	9.01	9.43		*LSD/ 6.78	DA/ 7.71	AC/ 9.53	MGO/ 10.18	WL/ 13.38
MARCA-2	90%	10.77	10.66		*LSD/ 8.87	DA/ 10.18	AC/ 10.68	MGO/ 11.41	WL/ 12.54
NPCC	80%	6.19	6.30		*LSD/ 4.69	DA/ 5.36	AC/ 6.63	MGO/ 7.03	WL/ 9.25
SERC	90%	10.89	8.75		*LSD/ 9.11	MGO/ 9.96	DA/ 10.35	AC/ 10.51	WL/ 12.29
SPP-1	90%	11.38	10.35		*LSD/ 9.38	DA/ 10.70	AC/ 10.90	MGO/ 11.60	WL/ 13.33
SPP-2	90%	10.69	9.15		*LSD/ 8.98	MGO/ 9.49	AC/ 9.88	DA/ 10.18	WL/ 11.90
WSCC-1	80%	7.15	7.46		*LSD/ 5.42	DA/ 6.16	AC/ 7.48	MGO/ 8.13	WL/ 10.43
WSCC-2	70%	7.89	8.04		LSD/ 6.01	DA/ 6.94	AC/ 8.28	MGO/ 9.10	WL/ 11.24
WSCC-3	70%	7.42	7.98		LSD/ 5.64	DA/ 6.56	AC/ 7.89	MGO/ 8.49	WL/ 10.85
WSCC-4	70%	7.15	7.42		LSD/ 5.44	DA/ 6.33	AC/ 7.58	MGO/ 8.12	WL/ 10.47
LOW SULFUR COAL									
ECAR	70%	7.10	7.02		LSD/ 5.42	DA/ 6.29	AC/ 7.60	MGO/ 8.02	WL/ 10.11
ERCOT	70%	8.53	8.68		LSD/ 6.49	DA/ 7.49	AC/ 8.96	MGO/ 9.58	WL/ 12.27
MAAC	70%	6.65	6.65		LSD/ 5.05	DA/ 5.91	AC/ 7.26	MGO/ 7.60	WL/ 9.80
MAIN	70%	7.08	7.15		LSD/ 5.35	DA/ 6.25	AC/ 7.81	MGO/ 8.41	WL/ 10.35
MARCA-1	70%	8.21	8.56		LSD/ 6.22	DA/ 7.19	AC/ 8.67	MGO/ 9.42	WL/ 11.86
MARCA-2	70%	7.75	8.00		LSD/ 5.92	DA/ 6.83	AC/ 8.20	MGO/ 8.79	WL/ 11.06
NPCC	70%	7.00	6.90		LSD/ 5.41	DA/ 6.23	AC/ 7.36	MGO/ 7.69	WL/ 9.86
SERC	70%	7.26	6.94		LSD/ 5.57	DA/ 6.44	AC/ 7.62	MGO/ 7.88	WL/ 10.29
SPP-1	70%	7.97	8.03		LSD/ 6.06	DA/ 6.98	AC/ 8.35	MGO/ 8.94	WL/ 11.49
SPP-2	70%	7.49	7.37		LSD/ 5.74	DA/ 6.63	AC/ 7.76	MGO/ 8.08	WL/ 10.61
WSCC-1	70%	8.09	8.40		LSD/ 6.26	DA/ 7.14	AC/ 8.20	MGO/ 9.00	WL/ 11.14
WSCC-2	70%	7.28	7.52		LSD/ 5.45	DA/ 6.28	AC/ 7.70	MGO/ 8.38	WL/ 10.72
WSCC-3	70%	6.77	7.20		LSD/ 5.06	DA/ 5.84	AC/ 7.22	MGO/ 7.75	WL/ 10.21
WSCC-4	70%	6.59	6.88		LSD/ 4.93	DA/ 5.72	AC/ 7.02	MGO/ 7.54	WL/ 9.98

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : BASE CASE ANALYSIS

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.02	MGO/18.71	WL/21.88
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.08	MGO/13.67	WL/19.53
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/10.07	MGO/10.48	WL/15.63
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/17.21	MGO/19.77	WL/21.92
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.17	MGO/14.82	WL/20.86
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/17.46	MGO/19.71	WL/22.77
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.25	MGO/10.71	WL/15.93
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	AC/17.19	MGO/18.09	WL/22.80
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.76	MGO/19.97	WL/23.88
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/16.48	MGO/17.55	WL/22.19
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.35	MGO/12.06	WL/16.89
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.77	MGO/13.90	WL/18.50
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.26	MGO/13.18	WL/18.48
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.79	MGO/12.65	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.85	MGO/12.59	WL/17.45
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.70	MGO/14.63	WL/20.13
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.37	MGO/12.04	WL/17.13
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.10	MGO/13.04	WL/17.47
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.28	MGO/14.34	WL/19.47
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.67	MGO/13.58	WL/18.41
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.49	MGO/12.14	WL/17.29
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.88	MGO/12.45	WL/17.77
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.80	MGO/13.64	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.07	MGO/12.69	WL/18.02
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.67	MGO/13.80	WL/18.42
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.61	MGO/12.39	WL/17.24
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.93	MGO/11.55	WL/16.98
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.69	MGO/11.32	WL/17.16

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
 AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LINE COST -50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	13.30	14.14		*LSD/10.05	DA/12.56	AC/17.02	MGO/18.59	WL/21.88
ERCOT	80%	12.21	12.92		*LSD/ 9.19	DA/10.29	AC/13.08	MGO/13.54	WL/19.53
MAAC	80%	8.96	9.51		*LSD/ 6.67	DA/ 7.65	AC/10.07	MGO/10.38	WL/15.63
MAIN	90%	12.89	14.05		*LSD/ 9.62	DA/12.15	AC/17.21	MGO/19.67	WL/21.92
MARCA-1	80%	13.31	14.14		*LSD/10.07	DA/11.20	AC/14.17	MGO/14.71	WL/20.86
MARCA-2	90%	13.93	16.07		*LSD/10.55	DA/13.07	AC/17.46	MGO/19.59	WL/22.77
NPCC	80%	9.19	9.76		*LSD/ 6.87	DA/ 7.84	AC/10.25	MGO/10.56	WL/15.93
SERC	90%	13.76	13.96		*LSD/10.49	DA/12.97	AC/17.19	MGO/17.95	WL/22.80
SPP-1	90%	14.69	15.91		*LSD/11.15	DA/13.66	AC/17.76	MGO/19.84	WL/23.88
SPP-2	90%	13.43	14.31		*LSD/10.24	DA/12.70	AC/16.48	MGO/17.41	WL/22.19
WSEC-1	80%	10.50	11.31		*LSD/ 7.87	DA/ 8.89	AC/11.35	MGO/11.90	WL/16.89
WSEC-2	70%	11.35	12.28		LSD/ 8.43	DA/ 9.80	AC/12.77	MGO/13.78	WL/18.50
WSEC-3	70%	10.75	12.07		LSD/ 7.95	DA/ 9.33	AC/12.26	MGO/13.06	WL/18.48
WSEC-4	70%	10.32	11.35		LSD/ 7.61	DA/ 8.97	AC/11.79	MGO/12.53	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.27	10.93		LSD/ 7.59	DA/ 8.93	AC/11.85	MGO/12.47	WL/17.45
ERCOT	70%	12.30	13.21		LSD/ 9.17	DA/10.59	AC/13.70	MGO/14.51	WL/20.13
MAAC	70%	9.71	10.41		LSD/ 7.15	DA/ 8.47	AC/11.37	MGO/11.93	WL/17.13
MAIN	70%	10.36	11.11		LSD/ 7.63	DA/ 8.99	AC/12.10	MGO/12.95	WL/17.47
MARCA-1	70%	11.92	12.98		LSD/ 8.85	DA/10.25	AC/13.28	MGO/14.22	WL/19.47
MARCA-2	70%	11.18	12.19		LSD/ 8.31	DA/ 9.67	AC/12.67	MGO/13.45	WL/18.41
NPCC	70%	9.94	10.68		LSD/ 7.37	DA/ 8.68	AC/11.49	MGO/11.99	WL/17.29
SERC	70%	10.37	10.86		LSD/ 7.67	DA/ 9.02	AC/11.88	MGO/12.31	WL/17.77
SPP-1	70%	11.53	12.29		LSD/ 8.57	DA/ 9.90	AC/12.80	MGO/13.51	WL/18.98
SPP-2	70%	10.71	11.39		LSD/ 7.93	DA/ 9.29	AC/12.07	MGO/12.55	WL/18.02
WSEC-1	70%	11.41	12.64		LSD/ 8.53	DA/ 9.87	AC/12.67	MGO/13.63	WL/18.42
WSEC-2	70%	10.69	11.42		LSD/ 7.93	DA/ 9.04	AC/11.61	MGO/12.26	WL/17.24
WSEC-3	70%	10.01	10.89		LSD/ 7.40	DA/ 8.47	AC/10.93	MGO/11.43	WL/16.98
WSEC-4	70%	9.70	10.48		LSD/ 7.15	DA/ 8.25	AC/10.69	MGO/11.20	WL/17.16

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
 AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST: SENSITIVITY ANALYSIS - Limestone Cost -50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	13.48		*LSD/11.87	DA/14.13	AC/17.02	MGO/18.71	WL/21.88
ERCOT	80%	12.39	12.81		*LSD/ 9.40	DA/10.47	AC/13.08	MGO/13.67	WL/19.53
MAAC	80%	9.12	9.44		*LSD/ 6.85	DA/ 7.80	AC/10.07	MGO/10.48	WL/15.63
MAIN	90%	14.22	13.39		*LSD/11.08	DA/13.42	AC/17.21	MGO/19.77	WL/21.92
MARCA-1	80%	13.48	13.99		*LSD/10.26	DA/11.37	AC/14.17	MGO/14.82	WL/20.86
MARCA-2	90%	15.62	14.76		*LSD/12.42	DA/14.68	AC/17.46	MGO/19.71	WL/22.77
NPCC	80%	9.42	9.64		*LSD/ 7.12	DA/ 8.06	AC/10.25	MGO/10.71	WL/15.93
SERC	90%	15.68	13.49		*LSD/12.60	DA/14.79	AC/17.19	MGO/18.09	WL/22.80
SPP-1	90%	16.45	15.02		*LSD/13.09	DA/15.34	AC/17.76	MGO/19.97	WL/23.88
SPP-2	90%	15.38	13.47		*LSD/12.39	DA/14.56	AC/16.48	MGO/17.55	WL/22.19
WSCC-1	80%	10.75	11.08		*LSD/ 8.15	DA/ 9.13	AC/11.35	MGO/12.06	WL/16.89
WSCC-2	70%	11.80	11.98		LSD/ 8.92	DA/10.22	AC/12.77	MGO/13.90	WL/18.50
WSCC-3	70%	11.16	11.58		LSD/ 8.41	DA/ 9.72	AC/12.26	MGO/13.18	WL/18.48
WSCC-4	70%	10.74	10.99		LSD/ 8.08	DA/ 9.37	AC/11.79	MGO/12.65	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.76		LSD/ 8.05	DA/ 9.34	AC/11.85	MGO/12.59	WL/17.45
ERCOT	70%	12.74	12.95		LSD/ 9.64	DA/11.00	AC/13.70	MGO/14.63	WL/20.13
MAAC	70%	10.08	10.24		LSD/ 7.55	DA/ 8.82	AC/11.37	MGO/12.04	WL/17.13
MAIN	70%	10.71	10.94		LSD/ 8.01	DA/ 9.32	AC/12.10	MGO/13.04	WL/17.47
MARCA-1	70%	12.30	12.65		LSD/ 9.27	DA/10.61	AC/13.28	MGO/14.34	WL/19.47
MARCA-2	70%	11.61	11.86		LSD/ 8.78	DA/10.09	AC/12.67	MGO/13.58	WL/18.41
NPCC	70%	10.46	10.41		LSD/ 7.95	DA/ 9.18	AC/11.49	MGO/12.14	WL/17.29
SERC	70%	10.87	10.73		LSD/ 8.22	DA/ 9.50	AC/11.88	MGO/12.45	WL/17.77
SPP-1	70%	11.93	12.09		LSD/ 9.01	DA/10.28	AC/12.80	MGO/13.64	WL/18.98
SPP-2	70%	11.20	11.18		LSD/ 8.48	DA/ 9.76	AC/12.07	MGO/12.69	WL/18.02
WSCC-1	70%	11.99	12.12		LSD/ 9.16	DA/10.42	AC/12.67	MGO/13.80	WL/18.42
WSCC-2	70%	10.93	11.26		LSD/ 8.19	DA/ 9.26	AC/11.61	MGO/12.39	WL/17.24
WSCC-3	70%	10.21	10.66		LSD/ 7.62	DA/ 8.66	AC/10.93	MGO/11.55	WL/16.98
WSCC-4	70%	9.93	10.29		LSD/ 7.41	DA/ 8.47	AC/10.69	MGO/11.32	WL/17.16

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SODA ASH COST -50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.01	AC/16.52	MGO/18.71	WL/20.38
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.46	AC/13.03	MGO/13.67	WL/18.13
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.79	AC/10.00	MGO/10.48	WL/14.07
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.31	AC/16.75	MGO/19.77	WL/20.53
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.35	AC/14.12	MGO/14.82	WL/19.53
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.57	AC/17.00	MGO/19.71	WL/21.37
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.05	AC/10.18	MGO/10.71	WL/14.33
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.66	AC/16.66	MGO/18.09	WL/21.16
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.22	AC/17.27	MGO/19.97	WL/22.38
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.43	AC/15.97	MGO/17.55	WL/20.64
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.12	AC/11.30	MGO/12.06	WL/15.64
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.19	AC/12.66	MGO/13.90	WL/17.22
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.69	AC/12.12	MGO/13.18	WL/16.85
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.33	AC/11.63	MGO/12.65	WL/16.50
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.31	AC/11.72	MGO/12.59	WL/16.01
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/10.97	AC/13.58	MGO/14.63	WL/18.68
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.79	AC/11.23	MGO/12.04	WL/15.53
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.30	AC/11.98	MGO/13.04	WL/16.14
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.58	AC/13.17	MGO/14.34	WL/18.10
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.06	AC/12.55	MGO/13.58	WL/17.06
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.15	AC/11.34	MGO/12.14	WL/15.64
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.47	AC/11.74	MGO/12.45	WL/16.21
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.25	AC/12.69	MGO/13.64	WL/17.55
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.72	AC/11.94	MGO/12.69	WL/16.53
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.39	AC/12.56	MGO/13.80	WL/17.14
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.25	AC/11.56	MGO/12.39	WL/15.99
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.64	AC/10.86	MGO/11.55	WL/15.39
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.45	AC/10.60	MGO/11.32	WL/15.32

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
 AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - MGO COST -50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.02	MGO/18.58	WL/21.88
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.08	MGO/13.65	WL/19.53
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/10.07	MGO/10.47	WL/15.63
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/17.21	MGO/19.64	WL/21.92
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.17	MGO/14.81	WL/20.86
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/17.46	MGO/19.59	WL/22.77
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.25	MGO/10.70	WL/15.93
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	AC/17.19	MGO/17.96	WL/22.80
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.76	MGO/19.85	WL/23.88
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/16.48	MGO/17.43	WL/22.19
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.35	MGO/12.05	WL/16.89
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.77	MGO/13.88	WL/18.50
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.26	MGO/13.15	WL/18.48
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.79	MGO/12.62	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.85	MGO/12.56	WL/17.45
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.70	MGO/14.60	WL/20.13
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.37	MGO/12.00	WL/17.13
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.10	MGO/13.01	WL/17.47
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.28	MGO/14.31	WL/19.47
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.67	MGO/13.55	WL/18.41
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.49	MGO/12.11	WL/17.29
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.88	MGO/12.42	WL/17.77
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.80	MGO/13.61	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.07	MGO/12.66	WL/18.02
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.67	MGO/13.77	WL/18.42
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.61	MGO/12.38	WL/17.24
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.93	MGO/11.54	WL/16.98
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.69	MGO/11.31	WL/17.16

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - FUEL OIL COST -50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/16.21	MGO/16.69	WL/21.88
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/12.99	MGO/13.43	WL/19.53
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/ 9.98	MGO/10.26	WL/15.63
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/16.15	MGO/17.13	WL/21.92
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.07	MGO/14.55	WL/20.86
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/16.55	MGO/17.44	WL/22.77
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.16	MGO/10.50	WL/15.93
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	MGO/16.52	AC/16.56	WL/22.80
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/16.95	MGO/17.95	WL/23.88
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/15.89	MGO/16.07	WL/22.19
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.24	MGO/11.80	WL/16.89
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.50	MGO/13.25	WL/18.50
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.03	MGO/12.60	WL/18.48
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.57	MGO/12.11	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.64	MGO/12.08	WL/17.45
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.49	MGO/14.09	WL/20.13
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.17	MGO/11.53	WL/17.13
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/11.82	MGO/12.36	WL/17.47
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.05	MGO/13.75	WL/19.47
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.44	MGO/12.99	WL/18.41
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.29	MGO/11.66	WL/17.29
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.72	MGO/12.04	WL/17.77
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.61	MGO/13.18	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/11.92	MGO/12.32	WL/18.02
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.43	MGO/13.19	WL/18.42
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.47	MGO/12.04	WL/17.24
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.82	MGO/11.27	WL/16.98
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.57	MGO/11.03	WL/17.16

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - NAT. GAS COST -50%

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.02	MGO/18.71	WL/21.75
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.08	MGO/13.67	WL/19.58
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/10.07	MGO/10.48	WL/15.69
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/17.21	MGO/19.77	WL/21.57
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.17	MGO/14.82	WL/20.89
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/17.46	MGO/19.71	WL/22.43
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.25	MGO/10.71	WL/15.98
SERC	90%	15.68	13.96		*LSD/12.50	DA/14.79	AC/17.19	MGO/18.09	WL/22.51
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.76	MGO/19.97	WL/23.61
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/16.48	MGO/17.55	WL/21.88
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.35	MGO/12.06	WL/16.93
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.77	MGO/13.90	WL/18.49
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.26	MGO/13.18	WL/18.46
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.79	MGO/12.65	WL/18.36
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.85	MGO/12.59	WL/17.45
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.70	MGO/14.63	WL/20.12
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.37	MGO/12.04	WL/17.11
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.10	MGO/13.04	WL/17.46
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.28	MGO/14.34	WL/19.47
MARCA-2	70%	11.61	12.19		LSD/ 8.73	DA/10.09	AC/12.67	MGO/13.58	WL/18.39
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.49	MGO/12.14	WL/17.28
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.88	MGO/12.45	WL/17.76
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.80	MGO/13.64	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.07	MGO/12.69	WL/18.01
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.67	MGO/13.80	WL/18.41
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.61	MGO/12.39	WL/17.28
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.93	MGO/11.55	WL/17.04
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.69	MGO/11.32	WL/17.19

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR COST -50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.97	MGO/18.71	WL/22.61
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.19	MGO/13.67	WL/19.43
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/10.17	MGO/10.48	WL/15.53
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/18.15	MGO/19.77	WL/22.64
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.28	MGO/14.82	WL/20.76
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/18.40	MGO/19.71	WL/23.49
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.35	MGO/10.71	WL/15.83
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	MGO/18.09	AC/18.13	WL/23.52
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/18.70	MGO/19.97	WL/24.60
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/17.42	MGO/17.55	WL/22.91
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.45	MGO/12.06	WL/16.78
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/13.00	MGO/13.90	WL/18.52
WSCC-3	70%	11.14	12.07		LSD/ 8.41	DA/ 9.72	AC/12.51	MGO/13.18	WL/18.50
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/12.02	MGO/12.65	WL/18.39
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/12.09	MGO/12.59	WL/17.48
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.95	MGO/14.63	WL/20.16
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.61	MGO/12.04	WL/17.15
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.34	MGO/13.04	WL/17.50
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.52	MGO/14.34	WL/19.49
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.91	MGO/13.58	WL/18.43
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.73	MGO/12.14	WL/17.32
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/12.12	MGO/12.45	WL/17.80
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/13.01	MGO/13.64	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.31	MGO/12.69	WL/18.04
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.91	MGO/13.80	WL/18.45
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.74	MGO/12.39	WL/17.15
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/11.04	MGO/11.55	WL/16.88
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.82	MGO/11.32	WL/17.07

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID COST -50%

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST(MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90Z	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.02	MGO/20.01	WL/21.88
ERCOT	80Z	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.08	MGO/13.81	WL/19.53
MAAC	80Z	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/10.07	MGO/10.63	WL/15.63
MAIN	90Z	14.22	14.05		*LSD/11.08	DA/13.42	AC/17.21	MGO/21.06	WL/21.92
MARCA-1	80Z	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.17	MGO/14.96	WL/20.86
MARCA-2	90Z	15.62	16.07		*LSD/12.42	DA/14.68	AC/17.46	MGO/21.00	WL/22.77
NPCC	80Z	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.25	MGO/10.86	WL/15.93
SERC	90Z	15.68	13.96		*LSD/12.60	DA/14.79	AC/17.19	MGO/19.38	WL/22.80
SPP-1	90Z	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.76	MGO/21.26	WL/23.88
SPP-2	90Z	15.38	14.31		*LSD/12.39	DA/14.56	AC/16.48	MGO/18.84	WL/22.19
WSCC-1	80Z	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.35	MGO/12.20	WL/16.89
WSCC-2	70Z	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.77	MGO/14.23	WL/18.50
WSCC-3	70Z	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.26	MGO/13.51	WL/18.48
WSCC-4	70Z	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.79	MGO/12.98	WL/18.37
LOW SULFUR COAL									
ECAR	70Z	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.85	MGO/12.93	WL/17.45
ERCOT	70Z	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.70	MGO/14.97	WL/20.13
MAAC	70Z	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.37	MGO/12.37	WL/17.13
MAIN	70Z	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.10	MGO/13.38	WL/17.47
MARCA-1	70Z	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.28	MGO/14.65	WL/19.47
MARCA-2	70Z	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.67	MGO/13.91	WL/18.41
NPCC	70Z	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.49	MGO/12.47	WL/17.29
SERC	70Z	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.88	MGO/12.79	WL/17.77
SPP-1	70Z	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.80	MGO/13.93	WL/18.98
SPP-2	70Z	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.07	MGO/13.02	WL/18.02
WSCC-1	70Z	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.67	MGO/14.12	WL/18.42
WSCC-2	70Z	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.61	MGO/12.56	WL/17.24
WSCC-3	70Z	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.93	MGO/11.71	WL/16.98
WSCC-4	70Z	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.69	MGO/11.50	WL/17.16

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SO₂ ABSORPTION UNIT COST -50%

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	13.11	12.20		*LSD/ 9.02	DA/12.62	AC/15.17	HGO/17.67	WL/20.29
ERCOT	80%	9.84	10.22		*LSD/ 5.50	DA/ 8.33	AC/10.47	HGO/12.20	WL/17.28
HAAC	80%	7.35	7.55		*LSD/ 4.14	DA/ 6.36	AC/ 8.30	HGO/ 9.49	WL/14.11
MAIN	90%	12.40	12.12		*LSD/ 8.26	DA/11.93	AC/15.38	HGO/18.75	WL/20.35
MARCA-1	80%	10.66	11.17		*LSD/ 5.97	DA/ 8.99	AC/11.27	HGO/13.19	WL/18.36
MARCA-2	90%	13.65	13.99		*LSD/ 9.37	DA/13.06	AC/15.47	HGO/18.60	WL/21.06
NPCC	80%	7.61	7.86		*LSD/ 4.36	DA/ 6.59	AC/ 8.44	HGO/ 9.70	WL/14.38
SERC	90%	13.76	11.94		*LSD/ 9.64	DA/13.22	AC/15.26	HGO/17.01	WL/21.15
SPP-1	90%	14.26	13.60		*LSD/ 9.72	DA/13.52	AC/15.53	HGO/18.72	WL/21.97
SPP-2	90%	13.56	12.39		*LSD/ 9.58	DA/13.07	AC/14.66	HGO/16.53	WL/20.63
WSCC-1	80%	8.62	9.06		*LSD/ 4.91	DA/ 7.37	AC/ 9.20	HGO/10.85	WL/15.03
WSCC-2	70%	9.62	9.99		LSD/ 5.61	DA/ 8.42	AC/10.56	HGO/12.67	WL/16.60
WSCC-3	70%	9.14	9.94		LSD/ 5.32	DA/ 8.06	AC/10.22	HGO/12.04	WL/16.72
WSCC-4	70%	8.81	9.31		LSD/ 5.14	DA/ 7.78	AC/ 9.84	HGO/11.56	WL/16.69
LOW SULFUR COAL									
ECAR	70%	8.79	8.92		LSD/ 5.15	DA/ 7.78	AC/ 9.94	HGO/11.52	WL/15.81
ERCOT	70%	10.34	10.68		LSD/ 5.99	DA/ 9.00	AC/11.25	HGO/13.26	WL/18.03
HAAC	70%	8.30	8.53		LSD/ 4.83	DA/ 7.37	AC/ 9.59	HGO/11.04	WL/15.59
MAIN	70%	8.77	9.06		LSD/ 5.05	DA/ 7.73	AC/10.14	HGO/11.95	WL/15.79
MARCA-1	70%	9.97	10.52		LSD/ 5.73	DA/ 8.67	AC/10.91	HGO/13.01	WL/17.43
MARCA-2	70%	9.50	9.96		LSD/ 5.56	DA/ 8.34	AC/10.53	HGO/12.38	WL/16.56
NPCC	70%	8.67	8.79		LSD/ 5.20	DA/ 7.71	AC/ 9.69	HGO/11.13	WL/15.74
SERC	70%	8.95	8.84		LSD/ 5.30	DA/ 7.93	AC/ 9.96	HGO/11.38	WL/16.12
SPP-1	70%	9.68	9.92		LSD/ 5.59	DA/ 8.42	AC/10.51	HGO/12.36	WL/17.01
SPP-2	70%	9.20	9.28		LSD/ 5.42	DA/ 8.11	AC/10.05	HGO/11.56	WL/16.28
WSCC-1	70%	9.84	10.37		LSD/ 5.89	DA/ 8.64	AC/10.49	HGO/12.58	WL/16.55
WSCC-2	70%	8.75	9.12		LSD/ 4.88	DA/ 7.46	AC/ 9.40	HGO/11.15	WL/15.34
WSCC-3	70%	8.18	8.75		LSD/ 4.54	DA/ 6.99	AC/ 8.88	HGO/10.40	WL/15.21
WSCC-4	70%	8.00	8.44		LSD/ 4.47	DA/ 6.88	AC/ 8.74	HGO/10.23	WL/15.48

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - REGENERATION UNIT COST -50%

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.06	AC/14.61	MGO/16.54	WL/19.45
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.45	AC/12.40	MGO/13.05	WL/18.84
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.78	AC/ 9.38	MGO/ 9.87	WL/14.94
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.35	AC/14.82	MGO/17.61	WL/19.50
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.35	AC/13.49	MGO/14.20	WL/20.17
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.61	AC/15.06	MGO/17.55	WL/20.35
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.04	AC/ 9.56	MGO/10.09	WL/15.24
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.72	AC/14.80	MGO/15.93	WL/20.38
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.26	AC/15.37	MGO/17.81	WL/21.46
SPP-2	90%	15.38	14.31		*LSD/12.39	AC/14.09	DA/14.48	MGO/15.39	WL/19.77
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.11	AC/10.67	MGO/11.44	WL/16.19
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.19	AC/11.68	MGO/12.92	WL/17.39
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.69	AC/11.16	MGO/12.19	WL/17.36
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.34	AC/10.70	MGO/11.67	WL/17.26
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.30	AC/10.74	MGO/11.59	WL/16.33
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/10.97	AC/12.60	MGO/13.63	WL/19.01
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.79	AC/10.27	MGO/11.04	WL/16.01
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.29	AC/10.99	MGO/12.04	WL/16.34
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.58	AC/12.21	MGO/13.36	WL/18.38
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.05	AC/11.57	MGO/12.58	WL/17.29
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.15	AC/10.39	MGO/11.15	WL/16.18
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.47	AC/10.77	MGO/11.45	WL/16.65
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.25	AC/11.77	MGO/12.71	WL/17.94
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.72	AC/10.98	MGO/11.70	WL/16.91
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.39	AC/11.57	MGO/12.81	WL/17.31
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.24	AC/10.86	MGO/11.71	WL/16.47
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.64	AC/10.20	MGO/10.90	WL/16.24
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.45	AC/ 9.91	MGO/10.63	WL/16.37

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID UNIT COST -50%

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.02	HGO/17.23	WL/21.88
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.08	HGO/13.34	WL/19.53
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/10.07	HGO/10.16	WL/15.63
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/17.21	HGO/18.30	WL/21.92
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.17	HGO/14.49	WL/20.86
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/17.46	HGO/18.24	WL/22.77
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.25	HGO/10.39	WL/15.93
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	HGO/16.62	AC/17.19	WL/22.80
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.76	HGO/18.50	WL/23.88
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	HGO/16.08	AC/16.48	WL/22.19
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.35	HGO/11.74	WL/16.89
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.77	HGO/13.34	WL/18.50
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.26	HGO/12.60	WL/18.48
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.79	HGO/12.08	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.85	HGO/12.01	WL/17.45
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.70	HGO/14.05	WL/20.13
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.37	HGO/11.46	WL/17.13
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.10	HGO/12.46	WL/17.47
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.28	HGO/13.77	WL/19.47
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.67	HGO/13.00	WL/18.41
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.49	HGO/11.57	WL/17.29
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	HGO/11.87	AC/11.88	WL/17.77
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.80	HGO/13.11	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.07	HGO/12.12	WL/18.02
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.67	HGO/13.22	WL/18.42
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.61	HGO/12.02	WL/17.24
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.93	HGO/11.20	WL/16.98
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.69	HGO/10.95	WL/17.16

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
 AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR UNIT COST -50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/16.25	MGO/18.71	WL/20.02
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/12.92	MGO/13.67	WL/19.14
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/ 9.90	MGO/10.48	WL/15.23
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/16.45	MGO/19.77	WL/20.07
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.01	MGO/14.82	WL/20.46
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/16.70	MGO/19.71	WL/20.92
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.08	MGO/10.71	WL/15.54
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	AC/16.43	MGO/18.09	WL/20.96
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.00	MGO/19.97	WL/22.03
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/15.72	MGO/17.55	WL/20.34
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.19	MGO/12.06	WL/16.49
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.48	MGO/13.90	WL/17.79
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/11.97	MGO/13.18	WL/17.76
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.50	MGO/12.65	WL/17.66
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.55	MGO/12.59	WL/16.73
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.41	MGO/14.63	WL/19.42
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.08	MGO/12.04	WL/16.41
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/11.80	MGO/13.04	WL/16.75
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.00	MGO/14.34	WL/18.78
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.38	MGO/13.58	WL/17.69
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.20	MGO/12.14	WL/16.58
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.58	MGO/12.45	WL/17.05
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.53	MGO/13.64	WL/18.33
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/11.78	MGO/12.69	WL/17.31
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.38	MGO/13.80	WL/17.71
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.43	MGO/12.39	WL/16.79
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.75	MGO/11.55	WL/16.55
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.50	MGO/11.32	WL/16.69

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LINE COST +50%

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	16.60	14.14		*LSD/13.69	DA/15.71	AC/17.02	MGO/18.83	WL/21.88
ERCOT	80%	12.58	12.92		*LSD/ 9.60	DA/10.65	AC/13.08	MGO/13.79	WL/19.53
MAAC	80%	9.28	9.51		*LSD/ 7.03	DA/ 7.95	AC/10.07	MGO/10.59	WL/15.63
MAIN	90%	15.55	14.05		*LSD/12.55	DA/14.69	AC/17.21	MGO/19.87	WL/21.92
MARCA-1	80%	13.65	14.14		*LSD/10.45	DA/11.53	AC/14.17	MGO/14.93	WL/20.86
MARCA-2	90%	17.32	16.07		*LSD/14.28	DA/16.30	AC/17.46	MGO/19.83	WL/22.77
NPCC	80%	9.65	9.76		*LSD/ 7.38	DA/ 8.28	AC/10.25	MGO/10.86	WL/15.93
SERC	90%	17.59	13.96		*LSD/14.71	DA/16.62	AC/17.19	MGO/18.23	WL/22.80
SPP-1	90%	18.22	15.91		*LSD/15.04	DA/17.02	AC/17.76	MGO/20.10	WL/23.88
SPP-2	90%	17.32	14.31		*LSD/14.54	DA/16.41	AC/16.48	MGO/17.69	WL/22.19
WSCC-1	80%	11.00	11.31		*LSD/ 8.43	DA/ 9.37	AC/11.35	MGO/12.23	WL/16.89
WSCC-2	70%	12.24	12.28		LSD/ 9.40	DA/10.64	AC/12.77	MGO/14.03	WL/18.50
WSCC-3	70%	11.58	12.07		LSD/ 8.86	DA/10.12	AC/12.26	MGO/13.30	WL/18.48
WSCC-4	70%	11.17	11.35		LSD/ 8.55	DA/ 9.77	AC/11.79	MGO/12.77	WL/18.37
LOW SULFUR COAL									
ECAR	70%	11.12	10.93		LSD/ 8.52	DA/ 9.74	AC/11.85	MGO/12.71	WL/17.45
ERCOT	70%	13.17	13.21		LSD/10.12	DA/11.41	AC/13.70	MGO/14.75	WL/20.13
MAAC	70%	10.45	10.41		LSD/ 7.96	DA/ 9.17	AC/11.37	MGO/12.14	WL/17.13
MAIN	70%	11.06	11.11		LSD/ 8.39	DA/ 9.65	AC/12.10	MGO/13.14	WL/17.47
MARCA-1	70%	12.68	12.98		LSD/ 9.69	DA/10.97	AC/13.28	MGO/14.45	WL/19.47
MARCA-2	70%	12.05	12.19		LSD/ 9.26	DA/10.50	AC/12.67	MGO/13.70	WL/18.41
NPCC	70%	10.99	10.68		LSD/ 8.53	DA/ 9.68	AC/11.49	MGO/12.29	WL/17.29
SERC	70%	11.37	10.86		LSD/ 8.77	DA/ 9.98	AC/11.88	MGO/12.59	WL/17.77
SPP-1	70%	12.33	12.29		LSD/ 9.45	DA/10.66	AC/12.80	MGO/13.77	WL/18.98
SPP-2	70%	11.69	11.39		LSD/ 9.02	DA/10.22	AC/12.07	MGO/12.83	WL/18.02
WSCC-1	70%	12.57	12.64		LSD/ 9.80	DA/10.97	AC/12.67	MGO/13.96	WL/18.42
WSCC-2	70%	11.16	11.42		LSD/ 8.45	DA/ 9.49	AC/11.61	MGO/12.52	WL/17.24
WSCC-3	70%	10.40	10.89		LSD/ 7.84	DA/ 8.85	AC/10.93	MGO/11.67	WL/16.98
WSCC-4	70%	10.17	10.48		LSD/ 7.67	DA/ 8.69	AC/10.69	MGO/11.45	WL/17.16

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LINSTONE COST +50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.80		*LSD/11.87	DA/14.13	AC/17.02	MGO/18.71	WL/21.88
ERCOT	80%	12.39	13.03		*LSD/ 9.40	DA/10.47	AC/13.08	MGO/13.67	WL/19.53
MAAC	80%	9.12	9.58		*LSD/ 6.85	DA/ 7.80	AC/10.07	MGO/10.48	WL/15.63
MAIN	90%	14.22	14.70		*LSD/11.08	DA/13.42	AC/17.21	MGO/19.77	WL/21.92
MARCA-1	80%	13.48	14.29		*LSD/10.26	DA/11.37	AC/14.17	MGO/14.82	WL/20.86
MARCA-2	90%	15.62	17.39		*LSD/12.42	DA/14.68	AC/17.46	MGO/19.71	WL/22.77
NPCC	80%	9.42	9.88		*LSD/ 7.12	DA/ 8.06	AC/10.25	MGO/10.71	WL/15.93
SERC	90%	15.68	14.44		*LSD/12.60	DA/14.79	AC/17.19	MGO/18.09	WL/22.80
SPP-1	90%	16.45	16.81		*LSD/13.09	DA/15.34	AC/17.76	MGO/19.97	WL/23.88
SPP-2	90%	15.38	15.15		*LSD/12.39	DA/14.56	AC/16.48	MGO/17.55	WL/22.19
WSCC-1	80%	10.75	11.53		*LSD/ 8.15	DA/ 9.13	AC/11.35	MGO/12.06	WL/16.89
WSCC-2	70%	11.80	12.58		LSD/ 8.92	DA/10.22	AC/12.77	MGO/13.90	WL/18.50
WSCC-3	70%	11.16	12.56		LSD/ 8.41	DA/ 9.72	AC/12.26	MGO/13.18	WL/18.48
WSCC-4	70%	10.74	11.71		LSD/ 8.08	DA/ 9.37	AC/11.79	MGO/12.65	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	11.10		LSD/ 8.05	DA/ 9.34	AC/11.85	MGO/12.59	WL/17.45
ERCOT	70%	12.74	13.47		LSD/ 9.64	DA/11.00	AC/13.70	MGO/14.63	WL/20.13
MAAC	70%	10.08	10.58		LSD/ 7.55	DA/ 8.82	AC/11.37	MGO/12.04	WL/17.13
MAIN	70%	10.71	11.28		LSD/ 8.01	DA/ 9.32	AC/12.10	MGO/13.04	WL/17.47
MARCA-1	70%	12.30	13.30		LSD/ 9.27	DA/10.61	AC/13.28	MGO/14.34	WL/19.47
MARCA-2	70%	11.61	12.53		LSD/ 8.78	DA/10.09	AC/12.67	MGO/13.58	WL/18.41
NPCC	70%	10.46	10.96		LSD/ 7.95	DA/ 9.18	AC/11.49	MGO/12.14	WL/17.29
SERC	70%	10.87	10.98		LSD/ 8.22	DA/ 9.50	AC/11.88	MGO/12.45	WL/17.77
SPP-1	70%	11.93	12.49		LSD/ 9.01	DA/10.28	AC/12.80	MGO/13.64	WL/18.98
SPP-2	70%	11.20	11.60		LSD/ 8.48	DA/ 9.76	AC/12.07	MGO/12.69	WL/18.02
WSCC-1	70%	11.99	13.15		LSD/ 9.16	DA/10.42	AC/12.67	MGO/13.80	WL/18.42
WSCC-2	70%	10.93	11.58		LSD/ 8.19	DA/ 9.26	AC/11.61	MGO/12.39	WL/17.24
WSCC-3	70%	10.21	11.13		LSD/ 7.62	DA/ 8.66	AC/10.93	MGO/11.55	WL/16.98
WSCC-4	70%	9.93	10.68		LSD/ 7.41	DA/ 8.47	AC/10.69	MGO/11.32	WL/17.16

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SODA ASH COST +50%

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		\$LSD/11.87	DA/14.25	AC/17.51	MGO/18.71	WL/23.39
ERCOT	80%	12.39	12.92		\$LSD/ 9.40	DA/10.48	AC/13.14	MGO/13.67	WL/20.94
MAAC	80%	9.12	9.51		\$LSD/ 6.85	DA/ 7.82	AC/10.13	MGO/10.48	WL/17.19
MAIN	90%	14.22	14.05		\$LSD/11.08	DA/13.53	AC/17.66	MGO/19.77	WL/23.32
MARCA-1	80%	13.48	14.14		\$LSD/10.26	DA/11.38	AC/14.22	MGO/14.82	WL/22.19
MARCA-2	90%	15.62	16.07		\$LSD/12.42	DA/14.80	AC/17.91	MGO/19.71	WL/24.18
NPCC	80%	9.42	9.76		\$LSD/ 7.12	DA/ 8.08	AC/10.31	MGO/10.71	WL/17.54
SERC	90%	15.68	13.96		\$LSD/12.60	DA/14.92	AC/17.72	MGO/18.09	WL/24.44
SPP-1	90%	16.45	15.91		\$LSD/13.09	DA/15.46	AC/18.24	MGO/19.97	WL/25.39
SPP-2	90%	15.38	14.31		\$LSD/12.39	DA/14.68	AC/16.98	MGO/17.55	WL/23.75
WSCC-1	80%	10.75	11.31		\$LSD/ 8.15	DA/ 9.14	AC/11.40	MGO/12.06	WL/18.14
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.25	AC/12.87	MGO/13.90	WL/19.77
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.76	AC/12.40	MGO/13.18	WL/20.10
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.41	AC/11.95	MGO/12.65	WL/20.24
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.37	AC/11.97	MGO/12.59	WL/18.89
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.03	AC/13.83	MGO/14.63	WL/21.59
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.86	AC/11.51	MGO/12.04	WL/18.73
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.35	AC/12.22	MGO/13.04	WL/18.80
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.64	AC/13.40	MGO/14.34	WL/20.84
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.11	AC/12.79	MGO/13.58	WL/19.75
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.21	AC/11.63	MGO/12.14	WL/18.94
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.53	AC/12.02	MGO/12.45	WL/19.34
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.31	AC/12.91	MGO/13.64	WL/20.41
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.79	AC/12.19	MGO/12.69	WL/19.50
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.45	AC/12.78	MGO/13.80	WL/19.71
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.28	AC/11.67	MGO/12.39	WL/18.48
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.67	AC/11.00	MGO/11.55	WL/18.56
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.49	AC/10.77	MGO/11.32	WL/18.99

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
 AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - MGO COST +50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.02	MGO/18.84	WL/21.88
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.08	MGO/13.68	WL/19.53
MAAC	80%	9.12	9.51		*LSD/ 8.85	DA/ 7.80	AC/10.07	MGO/10.50	WL/15.63
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/17.21	MGO/19.90	WL/21.92
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.17	MGO/14.83	WL/20.86
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/17.46	MGO/19.83	WL/22.77
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.25	MGO/10.73	WL/15.93
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	AC/17.19	MGO/18.22	WL/22.80
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.76	MGO/20.08	WL/23.88
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/16.48	MGO/17.67	WL/22.19
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.35	MGO/12.07	WL/16.89
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.77	MGO/13.93	WL/18.50
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.26	MGO/13.21	WL/18.48
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.79	MGO/12.68	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.85	MGO/12.63	WL/17.45
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.70	MGO/14.66	WL/20.13
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.37	MGO/12.07	WL/17.13
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.10	MGO/13.08	WL/17.47
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.28	MGO/14.37	WL/19.47
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.67	MGO/13.61	WL/18.41
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.49	MGO/12.18	WL/17.29
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.88	MGO/12.49	WL/17.77
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.80	MGO/13.66	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.07	MGO/12.72	WL/18.02
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.67	MGO/13.82	WL/18.42
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.61	MGO/12.40	WL/17.24
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.93	MGO/11.56	WL/16.98
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.69	MGO/11.34	WL/17.16

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - FUEL OIL COST +50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.82	MGO/20.73	WL/21.88
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.18	MGO/13.90	WL/19.53
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/10.15	MGO/10.70	WL/15.63
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/18.26	WL/21.92	MGO/22.42
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.28	MGO/15.08	WL/20.86
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/18.36	MGO/21.98	WL/22.77
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.33	MGO/10.93	WL/15.93
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	AC/17.81	MGO/19.66	WL/22.80
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/18.56	MGO/21.99	WL/23.88
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/17.07	MGO/19.03	WL/22.19
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.46	MGO/12.33	WL/16.89
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/13.03	MGO/14.56	WL/18.50
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.49	MGO/13.76	WL/18.48
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/12.00	MGO/13.19	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/12.05	MGO/13.11	WL/17.45
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.92	MGO/15.17	WL/20.13
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.57	MGO/12.55	WL/17.13
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.37	MGO/13.73	WL/17.47
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.52	MGO/14.92	WL/19.47
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.90	MGO/14.16	WL/18.41
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.68	MGO/12.63	WL/17.29
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/12.04	MGO/12.86	WL/17.77
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.98	MGO/14.10	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.22	MGO/13.06	WL/18.02
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.91	MGO/14.40	WL/18.42
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.75	MGO/12.74	WL/17.24
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/11.04	MGO/11.83	WL/16.98
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.80	MGO/11.62	WL/17.16

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - NAT. GAS COST +50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.02	MGO/18.71	WL/22.01
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.08	MGO/13.67	WL/19.49
MAAC	80%	9.12	9.51		*LSD/ 6.65	DA/ 7.80	AC/10.07	MGO/10.48	WL/15.57
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/17.21	MGO/19.77	WL/22.27
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.17	MGO/14.82	WL/20.83
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/17.46	MGO/19.71	WL/23.11
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.25	MGO/10.71	WL/15.88
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	AC/17.19	MGO/18.09	WL/23.10
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.76	MGO/19.97	WL/24.16
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/16.48	MGO/17.55	WL/22.51
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.35	MGO/12.06	WL/16.84
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.77	MGO/13.90	WL/18.50
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.26	MGO/13.18	WL/18.49
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.79	MGO/12.65	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.06	DA/ 9.34	AC/11.85	MGO/12.59	WL/17.46
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.70	MGO/14.63	WL/20.15
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.37	MGO/12.04	WL/17.14
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.10	MGO/13.04	WL/17.48
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.28	MGO/14.34	WL/19.48
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.67	MGO/13.58	WL/18.42
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.49	MGO/12.14	WL/17.30
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.88	MGO/12.45	WL/17.79
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.80	MGO/13.64	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.07	MGO/12.69	WL/18.03
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.67	MGO/13.80	WL/18.43
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.61	MGO/12.39	WL/17.20
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.93	MGO/11.55	WL/16.91
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.69	MGO/11.32	WL/17.12

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR COST +50%

APPLICATION: NEW					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/16.06	MGO/18.71	WL/21.16
ERCOT	80%	12.39	12.52		*LSD/ 9.40	DA/10.47	AC/12.98	MGO/13.67	WL/19.64
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/ 9.96	MGO/10.48	WL/15.74
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/16.26	MGO/19.77	WL/21.21
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.07	MGO/14.82	WL/20.97
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/16.51	MGO/19.71	WL/22.05
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.14	MGO/10.71	WL/16.04
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	AC/16.25	MGO/18.09	WL/22.09
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/16.81	MGO/19.97	WL/23.17
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	AC/15.53	MGO/17.55	WL/21.48
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.24	MGO/12.06	WL/16.99
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.53	MGO/13.90	WL/18.47
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.02	MGO/13.18	WL/18.45
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.55	MGO/12.65	WL/18.35
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.60	MGO/12.59	WL/17.42
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.46	MGO/14.63	WL/20.11
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.13	MGO/12.04	WL/17.10
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/11.85	MGO/13.04	WL/17.44
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.05	MGO/14.34	WL/19.45
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.43	MGO/13.58	WL/18.38
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.25	MGO/12.14	WL/17.27
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.63	MGO/12.45	WL/17.75
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.58	MGO/13.64	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/11.83	MGO/12.69	WL/18.00
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.43	MGO/13.80	WL/18.40
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.49	MGO/12.39	WL/17.33
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.81	MGO/11.55	WL/17.07
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.56	MGO/11.32	WL/17.24

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
 AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-2. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID COST +50%

APPLICATION: NEW

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.95	14.14		*LSD/11.87	DA/14.13	AC/17.02	HGO/17.41	WL/21.88
ERCOT	80%	12.39	12.92		*LSD/ 9.40	DA/10.47	AC/13.08	HGO/13.52	WL/19.53
MAAC	80%	9.12	9.51		*LSD/ 6.85	DA/ 7.80	AC/10.07	HGO/10.34	WL/15.63
MAIN	90%	14.22	14.05		*LSD/11.08	DA/13.42	AC/17.21	HGO/18.48	WL/21.92
MARCA-1	80%	13.48	14.14		*LSD/10.26	DA/11.37	AC/14.17	HGO/14.67	WL/20.86
MARCA-2	90%	15.62	16.07		*LSD/12.42	DA/14.68	AC/17.46	HGO/18.41	WL/22.77
NPCC	80%	9.42	9.76		*LSD/ 7.12	DA/ 8.06	AC/10.25	HGO/10.57	WL/15.93
SERC	90%	15.68	13.96		*LSD/12.60	DA/14.79	HGO/16.80	AC/17.19	WL/22.80
SPP-1	90%	16.45	15.91		*LSD/13.09	DA/15.34	AC/17.76	HGO/18.68	WL/23.88
SPP-2	90%	15.38	14.31		*LSD/12.39	DA/14.56	HGO/16.25	AC/16.48	WL/22.19
WSCC-1	80%	10.75	11.31		*LSD/ 8.15	DA/ 9.13	AC/11.35	HGO/11.92	WL/16.89
WSCC-2	70%	11.80	12.28		LSD/ 8.92	DA/10.22	AC/12.77	HGO/13.58	WL/18.50
WSCC-3	70%	11.16	12.07		LSD/ 8.41	DA/ 9.72	AC/12.26	HGO/12.85	WL/18.48
WSCC-4	70%	10.74	11.35		LSD/ 8.08	DA/ 9.37	AC/11.79	HGO/12.33	WL/18.37
LOW SULFUR COAL									
ECAR	70%	10.70	10.93		LSD/ 8.05	DA/ 9.34	AC/11.85	HGO/12.26	WL/17.45
ERCOT	70%	12.74	13.21		LSD/ 9.64	DA/11.00	AC/13.70	HGO/14.30	WL/20.13
MAAC	70%	10.08	10.41		LSD/ 7.55	DA/ 8.82	AC/11.37	HGO/11.71	WL/17.13
MAIN	70%	10.71	11.11		LSD/ 8.01	DA/ 9.32	AC/12.10	HGO/12.71	WL/17.47
MARCA-1	70%	12.30	12.98		LSD/ 9.27	DA/10.61	AC/13.28	HGO/14.02	WL/19.47
MARCA-2	70%	11.61	12.19		LSD/ 8.78	DA/10.09	AC/12.67	HGO/13.24	WL/18.41
NPCC	70%	10.46	10.68		LSD/ 7.95	DA/ 9.18	AC/11.49	HGO/11.82	WL/17.29
SERC	70%	10.87	10.86		LSD/ 8.22	DA/ 9.50	AC/11.88	HGO/12.12	WL/17.77
SPP-1	70%	11.93	12.29		LSD/ 9.01	DA/10.28	AC/12.80	HGO/13.35	WL/18.98
SPP-2	70%	11.20	11.39		LSD/ 8.48	DA/ 9.76	AC/12.07	HGO/12.36	WL/18.02
WSCC-1	70%	11.99	12.64		LSD/ 9.16	DA/10.42	AC/12.67	HGO/13.47	WL/18.42
WSCC-2	70%	10.93	11.42		LSD/ 8.19	DA/ 9.26	AC/11.61	HGO/12.22	WL/17.24
WSCC-3	70%	10.21	10.89		LSD/ 7.62	DA/ 8.66	AC/10.93	HGO/11.39	WL/16.98
WSCC-4	70%	9.93	10.48		LSD/ 7.41	DA/ 8.47	AC/10.69	HGO/11.15	WL/17.16

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : BASE CASE ANALYSIS

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.81	MGO/11.97	WL/11.99
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.43	MGO/ 9.86	WL/12.60
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.93	MGO/ 7.24	WL/ 9.25
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.01	WL/12.31	MGO/12.90
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.29	MGO/10.78	WL/13.73
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.17	MGO/12.80	WL/12.95
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.07	MGO/ 7.43	WL/ 9.42
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	AC/10.98	MGO/11.47	WL/12.68
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/11.50	MGO/13.08	WL/13.78
SPP-2	90%	10.77	9.46		*LSD/ 9.59	DA/10.34	AC/10.36	MGO/11.00	WL/12.28
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.02	MGO/ 8.57	WL/10.67
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.86	MGO/ 9.71	WL/11.53
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.42	MGO/ 9.09	WL/11.09
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.08	MGO/ 8.71	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.09	MGO/ 8.61	WL/10.36
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.61	MGO/10.28	WL/12.60
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.71	MGO/ 8.17	WL/10.01
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.30	MGO/ 8.99	WL/10.60
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.30	MGO/10.08	WL/12.17
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.76	MGO/ 9.42	WL/11.34
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.81	MGO/ 8.26	WL/10.07
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.12	MGO/ 8.50	WL/10.53
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.95	MGO/ 9.56	WL/11.78
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.29	MGO/ 8.71	WL/10.87
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.77	MGO/ 9.62	WL/11.43
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.27	MGO/ 8.86	WL/10.98
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.75	MGO/ 8.21	WL/10.43
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.53	MGO/ 8.00	WL/10.17

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LINE COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	9.00	9.30		*LSD/ 7.65	DA/ 8.65	AC/10.81	MGO/11.87	WL/11.99
ERCOT	80%	8.67	9.14		*LSD/ 7.15	DA/ 7.57	AC/ 9.43	MGO/ 9.77	WL/12.60
MAAC	80%	6.19	6.51		*LSD/ 5.07	DA/ 5.43	AC/ 6.93	MGO/ 7.16	WL/ 9.25
MAIN	90%	8.68	9.24		*LSD/ 7.28	DA/ 8.33	AC/11.01	WL/12.31	MGO/12.83
MARCA-1	80%	9.49	10.07		*LSD/ 7.82	DA/ 8.29	AC/10.29	MGO/10.69	WL/13.73
MARCA-2	90%	9.48	10.88		*LSD/ 8.00	DA/ 9.05	AC/11.17	MGO/12.70	WL/12.95
NPCC	80%	6.36	6.70		*LSD/ 5.21	DA/ 5.59	AC/ 7.07	MGO/ 7.30	WL/ 9.42
SERC	90%	9.39	9.16		*LSD/ 8.02	DA/ 9.01	AC/10.98	MGO/11.36	WL/12.68
SPP-1	90%	10.11	10.75		*LSD/ 8.61	DA/ 9.60	AC/11.50	MGO/12.98	WL/13.78
SPP-2	90%	9.13	9.46		*LSD/ 7.79	DA/ 8.78	AC/10.36	MGO/10.88	WL/12.28
WSCC-1	80%	7.38	7.93		*LSD/ 6.08	DA/ 6.46	AC/ 8.02	MGO/ 8.44	WL/10.67
WSCC-2	70%	7.94	8.52		LSD/ 6.45	DA/ 7.08	AC/ 8.86	MGO/ 9.61	WL/11.53
WSCC-3	70%	7.47	8.37		LSD/ 6.06	DA/ 6.69	AC/ 8.42	MGO/ 9.00	WL/11.09
WSCC-4	70%	7.17	7.83		LSD/ 5.92	DA/ 6.43	AC/ 8.08	MGO/ 8.61	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.11	7.45		LSD/ 5.80	DA/ 6.38	AC/ 8.09	MGO/ 8.52	WL/10.36
ERCOT	70%	8.66	9.22		LSD/ 7.12	DA/ 7.71	AC/ 9.61	MGO/10.18	WL/12.60
MAAC	70%	6.69	7.06		LSD/ 5.47	DA/ 6.01	AC/ 7.71	MGO/ 8.09	WL/10.01
MAIN	70%	7.18	7.59		LSD/ 5.81	DA/ 6.42	AC/ 8.30	MGO/ 8.91	WL/10.60
MARCA-1	70%	8.37	9.06		LSD/ 6.83	DA/ 7.45	AC/ 9.30	MGO/ 9.99	WL/12.17
MARCA-2	70%	7.79	8.44		LSD/ 6.34	DA/ 6.96	AC/ 8.76	MGO/ 9.32	WL/11.34
NPCC	70%	6.87	7.28		LSD/ 5.63	DA/ 6.18	AC/ 7.81	MGO/ 8.14	WL/10.07
SERC	70%	7.19	7.39		LSD/ 5.88	DA/ 6.46	AC/ 8.12	MGO/ 8.38	WL/10.53
SPP-1	70%	8.10	8.55		LSD/ 6.63	DA/ 7.19	AC/ 8.95	MGO/ 9.46	WL/11.78
SPP-2	70%	7.46	7.82		LSD/ 6.05	DA/ 6.68	AC/ 8.29	MGO/ 8.60	WL/10.87
WSCC-1	70%	8.00	8.82		LSD/ 6.57	DA/ 7.14	AC/ 8.77	MGO/ 9.48	WL/11.43
WSCC-2	70%	7.55	8.02		LSD/ 6.10	DA/ 6.62	AC/ 8.27	MGO/ 8.76	WL/10.98
WSCC-3	70%	7.04	7.64		LSD/ 5.67	DA/ 6.17	AC/ 7.75	MGO/ 8.12	WL/10.43
WSCC-4	70%	6.80	7.30		LSD/ 5.60	DA/ 5.99	AC/ 7.53	MGO/ 7.90	WL/10.17

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LIMESTONE COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	8.75	*LSD/	9.18	DA/ 9.97	AC/10.81	MGO/11.97	WL/11.99
ERCOT	80%	8.82	9.05	*LSD/	7.32	DA/ 7.72	AC/ 9.43	MGO/ 9.86	WL/12.60
MAAC	80%	6.32	6.44	*LSD/	5.22	DA/ 5.56	AC/ 6.93	MGO/ 7.24	WL/ 9.25
MAIN	90%	9.80	8.69	*LSD/	8.51	DA/ 9.39	AC/11.01	WL/12.31	MGO/12.90
MARCA-1	80%	9.63	9.95	*LSD/	7.98	DA/ 8.42	AC/10.29	MGO/10.78	WL/13.73
MARCA-2	90%	10.90	9.77	*LSD/	9.57	DA/10.41	AC/11.17	MGO/12.80	WL/12.95
NPCC	80%	6.56	6.60	*LSD/	5.42	DA/ 5.78	AC/ 7.07	MGO/ 7.43	WL/ 9.42
SERC	90%	11.00	8.76	*LSD/	9.79	DA/10.54	AC/10.98	MGO/11.47	WL/12.68
SPP-1	90%	11.60	10.00	*LSD/	10.25	DA/11.01	AC/11.50	MGO/13.08	WL/13.78
SPP-2	90%	10.77	8.76	*LSD/	9.59	DA/10.34	AC/10.36	MGO/11.00	WL/12.28
WSSC-1	80%	7.59	7.74	*LSD/	6.31	DA/ 6.66	AC/ 8.02	MGO/ 8.57	WL/10.67
WSSC-2	70%	8.32	8.27	LSD/	6.86	DA/ 7.44	AC/ 8.86	MGO/ 9.71	WL/11.53
WSSC-3	70%	7.82	7.96	LSD/	6.44	DA/ 7.02	AC/ 8.42	MGO/ 9.09	WL/11.09
WSSC-4	70%	7.52	7.52	LSD/	6.31	DA/ 6.77	AC/ 8.08	MGO/ 8.71	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.31	LSD/	6.20	DA/ 6.72	AC/ 8.09	MGO/ 8.61	WL/10.36
ERCOT	70%	9.02	9.00	LSD/	7.52	DA/ 8.06	AC/ 9.61	MGO/10.28	WL/12.60
MAAC	70%	7.00	6.91	LSD/	5.81	DA/ 6.30	AC/ 7.71	MGO/ 8.17	WL/10.01
MAIN	70%	7.47	7.45	LSD/	6.13	DA/ 6.70	AC/ 8.30	MGO/ 8.99	WL/10.60
MARCA-1	70%	8.69	8.79	LSD/	7.18	DA/ 7.75	AC/ 9.30	MGO/10.08	WL/12.17
MARCA-2	70%	8.16	8.16	LSD/	6.75	DA/ 7.31	AC/ 8.76	MGO/ 9.42	WL/11.34
NPCC	70%	7.31	7.05	LSD/	6.12	DA/ 6.60	AC/ 7.81	MGO/ 8.26	WL/10.07
SERC	70%	7.61	7.29	LSD/	6.34	DA/ 6.86	AC/ 8.12	MGO/ 8.50	WL/10.53
SPP-1	70%	8.43	8.38	LSD/	7.00	DA/ 7.51	AC/ 8.95	MGO/ 9.56	WL/11.78
SPP-2	70%	7.87	7.64	LSD/	6.51	DA/ 7.07	AC/ 8.29	MGO/ 8.71	WL/10.87
WSSC-1	70%	8.48	8.39	LSD/	7.11	DA/ 7.60	AC/ 8.77	MGO/ 9.62	WL/11.43
WSSC-2	70%	7.75	7.88	LSD/	6.32	DA/ 6.81	AC/ 8.27	MGO/ 8.86	WL/10.98
WSSC-3	70%	7.20	7.44	LSD/	5.86	DA/ 6.33	AC/ 7.75	MGO/ 8.21	WL/10.43
WSSC-4	70%	7.00	7.14	LSD/	5.81	DA/ 6.18	AC/ 7.53	MGO/ 8.00	WL/10.17

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SODA ASH COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.87	AC/10.39	WL/11.72	MGO/11.97
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.71	AC/ 9.38	MGO/ 9.86	WL/12.34
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.55	AC/ 6.88	MGO/ 7.24	WL/ 8.97
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.30	AC/10.63	WL/12.06	MGO/12.90
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.41	AC/10.25	MGO/10.78	WL/13.48
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.31	AC/10.79	WL/12.69	MGO/12.80
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.76	AC/ 7.02	MGO/ 7.43	WL/ 9.13
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.43	AC/10.54	MGO/11.47	WL/12.39
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/10.91	AC/11.09	MGO/13.08	WL/13.51
SPP-2	90%	10.77	9.46		*LSD/ 9.59	AC/ 9.94	DA/10.23	MGO/11.00	WL/12.00
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.65	AC/ 7.98	MGO/ 8.57	WL/10.44
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.41	AC/ 8.77	MGO/ 9.71	WL/11.29
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 6.99	AC/ 8.30	MGO/ 9.09	WL/10.79
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.74	AC/ 7.95	MGO/ 8.71	WL/10.35
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.69	AC/ 7.98	MGO/ 8.61	WL/10.10
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.03	AC/ 9.50	MGO/10.28	WL/12.33
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.28	AC/ 7.59	MGO/ 8.17	WL/ 9.71
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.68	AC/ 8.20	MGO/ 8.99	WL/10.36
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.73	AC/ 9.20	MGO/10.08	WL/11.92
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.29	AC/ 8.66	MGO/ 9.42	WL/11.09
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.57	AC/ 7.69	MGO/ 8.26	WL/ 9.77
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.83	AC/ 8.00	MGO/ 8.50	WL/10.24
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.49	AC/ 8.86	MGO/ 9.56	WL/11.52
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.04	AC/ 8.18	MGO/ 8.71	WL/10.60
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.58	AC/ 8.68	MGO/ 9.62	WL/11.20
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.79	AC/ 8.23	MGO/ 8.86	WL/10.75
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.32	AC/ 7.69	MGO/ 8.21	WL/10.14
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.16	AC/ 7.45	MGO/ 8.00	WL/ 9.83

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - MGD COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)					
					1	2	3	4	5	
HIGH SULFUR COAL										
ECAR	90%	10.39	9.30	*LSD/	9.18	DA/	9.97	AC/10.81	MGO/11.86	WL/11.99
ERCOT	80%	8.82	9.14	*LSD/	7.32	DA/	7.72	AC/ 9.43	MGO/ 9.85	WL/12.60
MAAC	80%	6.32	6.51	*LSD/	5.22	DA/	5.56	AC/ 6.93	MGO/ 7.23	WL/ 9.25
MAIN	90%	9.80	9.24	*LSD/	8.51	DA/	9.39	AC/11.01	WL/12.31	MGO/12.80
MARCA-1	80%	9.63	10.07	*LSD/	7.98	DA/	8.42	AC/10.29	MGO/10.77	WL/13.73
MARCA-2	90%	10.90	10.88	*LSD/	9.57	DA/10.41	AC/11.17	MGO/12.70	WL/12.95	
NPCC	80%	6.56	6.70	*LSD/	5.42	DA/	5.78	AC/ 7.07	MGO/ 7.41	WL/ 9.42
SERC	90%	11.00	9.16	*LSD/	9.79	DA/10.54	AC/10.98	MGO/11.36	WL/12.68	
SPP-1	90%	11.60	10.75	*LSD/	10.25	DA/11.01	AC/11.50	MGO/12.98	WL/13.78	
SPP-2	90%	10.77	9.46	*LSD/	9.59	DA/10.34	AC/10.36	MGO/10.90	WL/12.28	
WSCC-1	80%	7.59	7.93	*LSD/	6.31	DA/	6.66	AC/ 8.02	MGO/ 8.56	WL/10.67
WSCC-2	70%	8.32	8.52	LSD/	6.86	DA/	7.44	AC/ 8.86	MGO/ 9.69	WL/11.53
WSCC-3	70%	7.82	8.37	LSD/	6.44	DA/	7.02	AC/ 8.42	MGO/ 9.07	WL/11.09
WSCC-4	70%	7.52	7.83	LSD/	6.31	DA/	6.77	AC/ 8.08	MGO/ 8.69	WL/10.69
LOW SULFUR COAL										
ECAR	70%	7.47	7.45	LSD/	6.20	DA/	6.72	AC/ 8.09	MGO/ 8.59	WL/10.36
ERCOT	70%	9.02	9.22	LSD/	7.52	DA/	8.06	AC/ 9.61	MGO/10.25	WL/12.60
MAAC	70%	7.00	7.06	LSD/	5.81	DA/	6.30	AC/ 7.71	MGO/ 8.14	WL/10.01
MAIN	70%	7.47	7.59	LSD/	6.13	DA/	6.70	AC/ 8.30	MGO/ 8.96	WL/10.60
MARCA-1	70%	8.69	9.06	LSD/	7.18	DA/	7.75	AC/ 9.30	MGO/10.05	WL/12.17
MARCA-2	70%	8.16	8.44	LSD/	6.75	DA/	7.31	AC/ 8.76	MGO/ 9.39	WL/11.34
NPCC	70%	7.31	7.28	LSD/	6.12	DA/	6.60	AC/ 7.81	MGO/ 8.23	WL/10.07
SERC	70%	7.61	7.39	LSD/	6.34	DA/	6.86	AC/ 8.12	MGO/ 8.47	WL/10.53
SPP-1	70%	8.43	8.55	LSD/	7.00	DA/	7.51	AC/ 8.95	MGO/ 9.54	WL/11.78
SPP-2	70%	7.87	7.82	LSD/	6.51	DA/	7.07	AC/ 8.29	MGO/ 8.69	WL/10.87
WSCC-1	70%	8.48	8.82	LSD/	7.11	DA/	7.60	AC/ 8.77	MGO/ 9.59	WL/11.43
WSCC-2	70%	7.75	8.02	LSD/	6.32	DA/	6.81	AC/ 8.27	MGO/ 8.85	WL/10.98
WSCC-3	70%	7.20	7.64	LSD/	5.86	DA/	6.33	AC/ 7.75	MGO/ 8.20	WL/10.43
WSCC-4	70%	7.00	7.30	LSD/	5.81	DA/	6.18	AC/ 7.53	MGO/ 7.98	WL/10.17

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGD - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - FUEL OIL COST -50X

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.13	MGO/10.27	WL/11.99
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.35	MGO/ 9.67	WL/12.60
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.86	MGO/ 7.06	WL/ 9.25
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/10.13	MGO/10.68	WL/12.31
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.20	MGO/10.56	WL/13.73
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/10.41	MGO/10.90	WL/12.95
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.00	MGO/ 7.25	WL/ 9.42
SERC	90%	11.00	9.16		*LSD/ 9.79	MGO/10.15	AC/10.45	DA/10.54	WL/12.68
SPP-1	90%	11.60	10.75		*LSD/10.25	AC/10.82	DA/11.01	MGO/11.38	WL/13.78
SPP-2	90%	10.77	9.46		*LSD/ 9.59	MGO/ 9.76	AC/ 9.87	DA/10.34	WL/12.28
WSSC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 7.94	MGO/ 8.35	WL/10.67
WSSC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.64	MGO/ 9.16	WL/11.53
WSSC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.23	MGO/ 8.60	WL/11.09
WSSC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 7.90	MGO/ 8.26	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 7.91	MGO/ 8.18	WL/10.36
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.42	MGO/ 9.82	WL/12.60
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.54	MGO/ 7.75	WL/10.01
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.07	MGO/ 8.41	WL/10.60
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.10	MGO/ 9.58	WL/12.17
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.56	MGO/ 8.93	WL/11.34
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.65	MGO/ 7.85	WL/10.07
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 7.98	MGO/ 8.15	WL/10.53
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.80	MGO/ 9.18	WL/11.78
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.16	MGO/ 8.40	WL/10.87
WSSC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.57	MGO/ 9.11	WL/11.43
WSSC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.16	MGO/ 8.57	WL/10.98
WSSC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.66	MGO/ 7.98	WL/10.43
WSSC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.43	MGO/ 7.75	WL/10.17

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABIE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - NAT. GAS COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST(MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.81	WL/11.86	MGO/11.97
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.43	MGO/ 9.86	WL/12.58
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.93	MGO/ 7.24	WL/ 9.22
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.01	WL/11.94	MGO/12.90
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.29	MGO/10.78	WL/13.71
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.17	WL/12.59	MGO/12.80
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.07	MGO/ 7.43	WL/ 9.40
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	AC/10.98	MGO/11.47	WL/12.37
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/11.50	MGO/13.08	WL/13.49
SPP-2	90%	10.77	9.46		*LSD/ 9.59	DA/10.34	AC/10.36	MGO/11.00	WL/11.95
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.02	MGO/ 8.57	WL/10.65
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.86	MGO/ 9.71	WL/11.45
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.42	MGO/ 9.09	WL/10.98
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.08	MGO/ 8.71	WL/10.62
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.09	MGO/ 8.61	WL/10.33
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.61	MGO/10.28	WL/12.53
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.71	MGO/ 8.17	WL/ 9.92
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.30	MGO/ 8.99	WL/10.52
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.30	MGO/10.08	WL/12.13
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.76	MGO/ 9.42	WL/11.26
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.81	MGO/ 8.26	WL/ 9.99
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.12	MGO/ 8.50	WL/10.46
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.95	MGO/ 9.56	WL/11.73
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.29	MGO/ 8.71	WL/10.80
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.77	MGO/ 9.62	WL/11.36
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.27	MGO/ 8.86	WL/10.95
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.75	MGO/ 8.21	WL/10.39
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.53	MGO/ 8.00	WL/10.14

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/11.61	MGO/11.97	WL/12.75
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.51	MGO/ 9.86	WL/12.65
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 7.02	MGO/ 7.24	WL/ 9.30
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.81	MGO/12.90	WL/13.06
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.38	MGO/10.78	WL/13.78
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.97	MGO/12.80	WL/13.70
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.16	MGO/ 7.43	WL/ 9.47
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	MGO/11.47	AC/11.77	WL/13.43
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/12.29	MGO/13.08	WL/14.53
SPP-2	90%	10.77	9.46		*LSD/ 9.59	DA/10.34	MGO/11.00	AC/11.16	WL/13.03
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.11	MGO/ 8.57	WL/10.72
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 9.06	MGO/ 9.71	WL/11.69
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.63	MGO/ 9.09	WL/11.25
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.28	MGO/ 8.71	WL/10.85
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.29	MGO/ 8.61	WL/10.53
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.81	MGO/10.28	WL/12.76
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.91	MGO/ 8.17	WL/10.17
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.50	MGO/ 8.99	WL/10.77
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.49	MGO/10.08	WL/12.33
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.96	MGO/ 9.42	WL/11.50
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 8.01	MGO/ 8.26	WL/10.23
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.32	MGO/ 8.50	WL/10.70
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 9.13	MGO/ 9.56	WL/11.92
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.49	MGO/ 8.71	WL/11.03
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.97	MGO/ 9.62	WL/11.59
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.38	MGO/ 8.86	WL/11.04
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.85	MGO/ 8.21	WL/10.49
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.63	MGO/ 8.00	WL/10.24

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.81	WL/11.99	MGO/13.06
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.43	MGO/ 9.99	WL/12.60
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.93	MGO/ 7.36	WL/ 9.25
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.01	WL/12.31	MGO/13.99
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.29	MGO/10.90	WL/13.73
MARCA-2	50%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.17	WL/12.95	MGO/13.89
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.07	MGO/ 7.55	WL/ 9.42
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	AC/10.98	MGO/12.55	WL/12.68
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/11.50	WL/13.78	MGO/14.16
SPP-2	90%	10.77	9.46		*LSD/ 9.59	DA/10.34	AC/10.36	MGO/12.08	WL/12.28
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.02	MGO/ 8.69	WL/10.67
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.86	MGO/ 9.99	WL/11.53
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.42	MGO/ 9.37	WL/11.09
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.08	MGO/ 8.98	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.09	MGO/ 8.89	WL/10.36
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.61	MGO/10.56	WL/12.60
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.71	MGO/ 8.45	WL/10.01
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.30	MGO/ 9.27	WL/10.60
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.30	MGO/10.35	WL/12.17
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.76	MGO/ 9.69	WL/11.34
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.81	MGO/ 8.54	WL/10.07
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.12	MGO/ 8.78	WL/10.53
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.95	MGO/ 9.81	WL/11.78
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.29	MGO/ 8.99	WL/10.87
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.77	MGO/ 9.89	WL/11.43
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.27	MGO/ 9.01	WL/10.98
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.75	MGO/ 8.34	WL/10.43
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.53	MGO/ 8.14	WL/10.17

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SO2 ABSORPTION UNIT COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	9.12	7.96		*LSD/ 7.20	DA/ 8.82	AC/ 9.41	WL/10.79	MGO/11.18
ERCOT	80%	7.06	7.29		*LSD/ 4.63	DA/ 6.09	AC/ 7.44	MGO/ 8.75	WL/10.90
HAAC	80%	5.10	5.22		*LSD/ 3.35	DA/ 4.46	AC/ 5.59	MGO/ 6.49	WL/ 8.10
MAIN	90%	8.54	7.92		*LSD/ 6.56	DA/ 8.26	AC/ 9.63	WL/11.13	MGO/12.13
MARCA-1	80%	7.69	8.02		*LSD/ 5.02	DA/ 6.62	AC/ 8.09	MGO/ 9.55	WL/11.84
MARCA-2	90%	9.55	9.44		*LSD/ 7.46	DA/ 9.17	AC/ 9.67	WL/11.66	MGO/11.96
NPCC	80%	5.31	5.39		*LSD/ 3.51	DA/ 4.65	AC/ 5.70	MGO/ 6.66	WL/ 8.25
SERC	90%	9.68	7.77		*LSD/ 7.74	DA/ 9.34	AC/ 9.52	MGO/10.65	WL/11.43
SPP-1	90%	10.09	9.15		*LSD/ 7.91	DA/ 9.63	AC/ 9.81	MGO/12.14	WL/12.34
SPP-2	90%	9.52	8.14		*LSD/ 7.65	AC/ 8.98	DA/ 9.21	MGO/10.23	WL/11.10
WSCC-1	80%	6.13	6.38		*LSD/ 4.07	DA/ 5.32	AC/ 6.39	MGO/ 7.66	WL/ 9.27
WSCC-2	70%	6.82	6.94		LSD/ 4.58	DA/ 6.07	AC/ 7.19	MGO/ 8.78	WL/10.10
WSCC-3	70%	6.42	6.90		LSD/ 4.31	DA/ 5.75	AC/ 6.88	MGO/ 8.23	WL/ 9.76
WSCC-4	70%	6.19	6.42		LSD/ 4.28	DA/ 5.56	AC/ 6.61	MGO/ 7.89	WL/ 9.43
LOW SULFUR COAL									
ECAR	70%	6.16	6.07		LSD/ 4.19	DA/ 5.53	AC/ 6.64	MGO/ 7.80	WL/ 9.12
ERCOT	70%	7.37	7.47		LSD/ 5.03	DA/ 6.53	AC/ 7.75	MGO/ 9.24	WL/11.01
HAAC	70%	5.77	5.76		LSD/ 3.93	DA/ 5.20	AC/ 6.36	MGO/ 7.42	WL/ 8.85
MAIN	70%	6.13	6.18		LSD/ 4.08	DA/ 5.49	AC/ 6.82	MGO/ 8.16	WL/ 9.33
MARCA-1	70%	7.09	7.37		LSD/ 4.74	DA/ 6.28	AC/ 7.50	MGO/ 9.07	WL/10.63
MARCA-2	70%	6.70	6.90		LSD/ 4.52	DA/ 5.98	AC/ 7.14	MGO/ 8.51	WL/ 9.95
NPCC	70%	6.07	5.98		LSD/ 4.22	DA/ 5.48	AC/ 6.44	MGO/ 7.50	WL/ 8.90
SERC	70%	6.30	6.00		LSD/ 4.33	DA/ 5.66	AC/ 6.66	MGO/ 7.68	WL/ 9.28
SPP-1	70%	6.88	6.91		LSD/ 4.64	DA/ 6.09	AC/ 7.22	MGO/ 8.60	WL/10.30
SPP-2	70%	6.49	6.37		LSD/ 4.40	DA/ 5.81	AC/ 6.76	MGO/ 7.86	WL/ 9.56
WSCC-1	70%	7.00	7.26		LSD/ 4.85	DA/ 6.25	AC/ 7.12	MGO/ 8.69	WL/10.02
WSCC-2	70%	6.24	6.43		LSD/ 4.03	DA/ 5.43	AC/ 6.60	MGO/ 7.93	WL/ 9.54
WSCC-3	70%	5.81	6.16		LSD/ 3.73	DA/ 5.06	AC/ 6.20	MGO/ 7.34	WL/ 9.10
WSCC-4	70%	5.66	5.90		LSD/ 3.78	DA/ 4.97	AC/ 6.05	MGO/ 7.17	WL/ 8.90

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - REGENERATION UNIT COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	AC/ 9.68	DA/ 9.93	WL/10.86	MGO/10.95
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.71	AC/ 9.11	MGO/ 9.58	WL/12.28
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.55	AC/ 6.61	MGO/ 6.96	WL/ 8.93
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.36	AC/ 9.90	WL/11.18	MGO/11.90
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.41	AC/ 9.97	MGO/10.49	WL/13.40
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	AC/10.05	DA/10.37	MGO/11.79	WL/11.82
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.77	AC/ 6.75	MGO/ 7.14	WL/ 9.10
SERC	90%	11.00	9.16		*LSD/ 9.79	AC/ 9.86	MGO/10.46	DA/10.51	WL/11.56
SPP-1	90%	11.60	10.75		*LSD/10.25	AC/10.38	DA/10.97	MGO/12.07	WL/12.65
SPP-2	90%	10.77	9.46		AC/ 9.24	*LSD/ 9.59	MGO/ 9.99	DA/10.30	WL/11.15
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.65	AC/ 7.70	MGO/ 8.29	WL/10.34
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.42	AC/ 8.35	MGO/ 9.26	WL/11.01
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.01	AC/ 7.91	MGO/ 8.63	WL/10.57
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.75	AC/ 7.58	MGO/ 8.25	WL/10.17
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.70	AC/ 7.57	MGO/ 8.15	WL/ 9.84
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.04	AC/ 9.09	MGO/ 9.81	WL/12.07
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.29	AC/ 7.19	MGO/ 7.71	WL/ 9.49
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.68	AC/ 7.78	MGO/ 8.52	WL/10.07
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.74	AC/ 8.79	MGO/ 9.63	WL/11.66
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.29	AC/ 8.24	MGO/ 8.95	WL/10.82
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.59	AC/ 7.30	MGO/ 7.80	WL/ 9.55
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.84	AC/ 7.60	MGO/ 8.03	WL/10.01
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.50	AC/ 8.47	MGO/ 9.13	WL/11.30
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.05	AC/ 7.78	MGO/ 8.25	WL/10.35
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.59	AC/ 8.26	MGO/ 9.15	WL/10.92
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.79	AC/ 7.92	MGO/ 8.55	WL/10.62
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.32	AC/ 7.41	MGO/ 7.91	WL/10.08
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.17	AC/ 7.16	MGO/ 7.67	WL/ 9.80

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN-LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID UNIT COST -50%

APPLICATION: RETROFIT					PLANT SIZE: 500 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.81	MGO/11.17	WL/11.99
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.43	MGO/ 9.69	WL/12.60
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.93	MGO/ 7.07	WL/ 9.25
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.01	MGO/12.11	WL/12.31
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.29	MGO/10.61	WL/13.73
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.17	MGO/12.01	WL/12.95
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.07	MGO/ 7.25	WL/ 9.42
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	MGO/10.68	AC/10.98	WL/12.68
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/11.50	MGO/12.29	WL/13.78
SPP-2	90%	10.77	9.46		*LSD/ 9.59	MGO/10.21	DA/10.34	AC/10.36	WL/12.28
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.02	MGO/ 8.40	WL/10.67
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.86	MGO/ 9.41	WL/11.53
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.42	MGO/ 8.78	WL/11.09
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.08	MGO/ 8.40	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.09	MGO/ 8.30	WL/10.36
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.61	MGO/ 9.97	WL/12.60
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.71	MGO/ 7.86	WL/10.01
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.30	MGO/ 8.68	WL/10.60
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.30	MGO/ 9.78	WL/12.17
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.76	MGO/ 9.10	WL/11.34
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.81	MGO/ 7.95	WL/10.07
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.12	MGO/ 8.18	WL/10.53
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.95	MGO/ 9.28	WL/11.78
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.29	MGO/ 8.40	WL/10.87
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.77	MGO/ 9.31	WL/11.43
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.27	MGO/ 8.67	WL/10.98
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.75	MGO/ 8.02	WL/10.43
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.53	MGO/ 7.79	WL/10.17

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR UNIT COST -50¢

APPLICATION: RETROFIT					PLANT SIZE: 500 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.39	WL/10.97	MGO/11.97
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.34	MGO/ 9.86	WL/12.38
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.84	MGO/ 7.24	WL/ 9.03
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/10.60	WL/11.29	MGO/12.90
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.20	MGO/10.78	WL/13.51
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/10.75	WL/11.93	MGO/12.80
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 6.98	MGO/ 7.43	WL/ 9.20
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	AC/10.56	MGO/11.47	WL/11.67
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/11.08	WL/12.76	MGO/13.08
SPP-2	90%	10.77	5.46		*LSD/ 9.59	AC/ 9.94	DA/10.34	MGO/11.00	WL/11.26
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 7.93	MGO/ 8.57	WL/10.45
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.70	MGO/ 9.71	WL/11.14
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.26	MGO/ 9.09	WL/10.70
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 7.93	MGO/ 8.71	WL/10.30
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 7.93	MGO/ 8.61	WL/ 9.97
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.44	MGO/10.28	WL/12.20
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.55	MGO/ 8.17	WL/ 9.61
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.13	MGO/ 8.99	WL/10.20
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.14	MGO/10.08	WL/11.79
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.60	MGO/ 9.42	WL/10.94
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.65	MGO/ 8.26	WL/ 9.68
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 7.95	MGO/ 8.50	WL/10.13
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.80	MGO/ 9.56	WL/11.42
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.13	MGO/ 8.71	WL/10.48
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.61	MGO/ 9.62	WL/11.04
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.17	MGO/ 8.86	WL/10.73
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.65	MGO/ 8.21	WL/10.19
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.42	MGO/ 8.00	WL/ 9.91

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LINE COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90Z	11.78	9.30		*LSD/10.71	AC/10.81	DA/11.29	WL/11.99	HGO/12.06
ERCOT	80Z	8.98	9.14		*LSD/ 7.49	DA/ 7.87	AC/ 9.43	HGO/ 9.96	WL/12.60
MAAC	80Z	6.45	6.51		*LSD/ 5.37	DA/ 5.69	AC/ 6.93	HGO/ 7.33	WL/ 9.25
MAIN	90Z	10.92	9.24		*LSD/ 9.74	DA/10.46	AC/11.01	WL/12.31	HGO/12.98
MARCA-1	80Z	9.78	10.07		*LSD/ 8.14	DA/ 8.56	AC/10.29	HGO/10.87	WL/13.73
MARCA-2	90Z	12.33	10.88		*LSD/11.13	AC/11.17	DA/11.76	HGO/12.90	WL/12.95
NPCC	80Z	6.75	6.70		*LSD/ 5.64	DA/ 5.96	AC/ 7.07	HGO/ 7.55	WL/ 9.42
SERC	90Z	12.61	9.16		AC/10.98	*LSD/11.56	HGO/11.58	DA/12.07	WL/12.68
SPP-1	90Z	13.08	10.75		AC/11.50	*LSD/11.88	DA/12.42	HGO/13.19	WL/13.78
SPP-2	90Z	12.40	9.46		AC/10.36	HGO/11.11	*LSD/11.40	DA/11.90	WL/12.28
WSCC-1	80Z	7.81	7.93		*LSD/ 6.55	DA/ 6.87	AC/ 8.02	HGO/ 8.71	WL/10.67
WSCC-2	70Z	8.69	8.52		LSD/ 7.27	DA/ 7.79	AC/ 8.86	HGO/ 9.82	WL/11.53
WSCC-3	70Z	8.17	8.37		LSD/ 6.82	DA/ 7.35	AC/ 8.42	HGO/ 9.19	WL/11.09
WSCC-4	70Z	7.88	7.83		LSD/ 6.70	DA/ 7.11	AC/ 8.08	HGO/ 8.81	WL/10.69
LOW SULFUR COAL									
ECAR	70Z	7.82	7.45		LSD/ 6.59	DA/ 7.05	AC/ 8.09	HGO/ 8.71	WL/10.36
ERCOT	70Z	9.38	9.22		LSD/ 7.92	DA/ 8.40	AC/ 9.61	HGO/10.38	WL/12.60
MAAC	70Z	7.30	7.06		LSD/ 6.15	DA/ 6.60	AC/ 7.71	HGO/ 8.26	WL/10.01
MAIN	70Z	7.76	7.59		LSD/ 6.45	DA/ 6.98	AC/ 8.30	HGO/ 9.07	WL/10.60
MARCA-1	70Z	9.01	9.06		LSD/ 7.53	DA/ 8.05	AC/ 9.30	HGO/10.17	WL/12.17
MARCA-2	70Z	8.53	8.44		LSD/ 7.15	DA/ 7.66	AC/ 8.76	HGO/ 9.52	WL/11.34
NPCC	70Z	7.76	7.28		LSD/ 6.50	DA/ 7.02	AC/ 7.81	HGO/ 8.38	WL/10.07
SERC	70Z	8.03	7.39		LSD/ 6.80	DA/ 7.26	AC/ 8.12	HGO/ 8.61	WL/10.53
SPP-1	70Z	8.77	8.55		LSD/ 7.17	DA/ 7.83	AC/ 8.95	HGO/ 9.67	WL/11.78
SPP-2	70Z	8.29	7.82		LSD/ 6.96	DA/ 7.46	AC/ 8.29	HGO/ 8.83	WL/10.87
WSCC-1	70Z	8.97	8.82		LSD/ 7.64	DA/ 8.07	AC/ 8.77	HGO/ 9.75	WL/11.43
WSCC-2	70Z	7.94	8.02		LSD/ 6.53	DA/ 6.99	AC/ 8.27	HGO/ 8.97	WL/10.98
WSCC-3	70Z	7.37	7.64		LSD/ 6.04	DA/ 6.49	AC/ 7.75	HGO/ 8.31	WL/10.43
WSCC-4	70Z	7.19	7.30		LSD/ 6.03	DA/ 6.36	AC/ 7.53	HGO/ 8.09	WL/10.17

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LIMESTONE COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.86		*LSD/ 9.18	DA/ 9.97	AC/10.81	MGO/11.97	WL/11.99
ERCOT	80%	8.82	9.24		*LSD/ 7.32	DA/ 7.72	AC/ 9.43	MGO/ 9.86	WL/12.60
MAAC	80%	6.32	6.57		*LSD/ 5.22	DA/ 5.56	AC/ 6.93	MGO/ 7.24	WL/ 9.25
MAIN	90%	9.80	9.80		*LSD/ 8.51	DA/ 9.39	AC/11.01	WL/12.31	MGO/12.90
MARCA-1	80%	9.63	10.20		*LSD/ 7.98	DA/ 8.42	AC/10.29	MGO/10.78	WL/13.73
MARCA-2	90%	10.90	11.98		*LSD/ 9.57	DA/10.41	AC/11.17	MGO/12.80	WL/12.95
NPCC	80%	6.56	6.80		*LSD/ 5.42	DA/ 5.78	AC/ 7.07	MGO/ 7.43	WL/ 9.42
SERC	90%	11.00	9.56		*LSD/ 9.79	DA/10.54	AC/10.98	MGO/11.47	WL/12.68
SPP-1	90%	11.60	11.50		*LSD/10.25	DA/11.01	AC/11.50	MGO/13.08	WL/13.78
SPP-2	90%	10.77	10.17		*LSD/ 9.59	DA/10.34	AC/10.36	MGO/11.00	WL/12.28
WSEC-1	80%	7.59	8.12		*LSD/ 6.31	DA/ 6.66	AC/ 8.02	MGO/ 8.57	WL/10.67
WSEC-2	70%	8.32	8.77		LSD/ 6.86	DA/ 7.44	AC/ 8.86	MGO/ 9.71	WL/11.53
WSEC-3	70%	7.82	8.79		LSD/ 6.44	DA/ 7.02	AC/ 8.42	MGO/ 9.09	WL/11.09
WSEC-4	70%	7.52	8.13		LSD/ 6.31	DA/ 6.77	AC/ 8.08	MGO/ 8.71	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.59		LSD/ 6.20	DA/ 6.72	AC/ 8.09	MGO/ 8.61	WL/10.36
ERCOT	70%	9.02	9.44		LSD/ 7.52	DA/ 8.06	AC/ 9.61	MGO/10.28	WL/12.60
MAAC	70%	7.00	7.20		LSD/ 5.81	DA/ 6.30	AC/ 7.71	MGO/ 8.17	WL/10.01
MAIN	70%	7.47	7.73		LSD/ 6.13	DA/ 6.70	AC/ 8.30	MGO/ 8.99	WL/10.60
MARCA-1	70%	8.69	9.34		LSD/ 7.18	DA/ 7.75	AC/ 9.30	MGO/10.08	WL/12.17
MARCA-2	70%	8.16	8.72		LSD/ 6.75	DA/ 7.31	AC/ 8.76	MGO/ 9.42	WL/11.34
NPCC	70%	7.31	7.51		LSD/ 6.12	DA/ 6.60	AC/ 7.81	MGO/ 8.26	WL/10.07
SERC	70%	7.61	7.50		LSD/ 6.34	DA/ 6.86	AC/ 8.12	MGO/ 8.50	WL/10.53
SPP-1	70%	8.43	8.72		LSD/ 7.00	DA/ 7.51	AC/ 8.95	MGO/ 9.56	WL/11.78
SPP-2	70%	7.87	8.00		LSD/ 6.51	DA/ 7.07	AC/ 8.29	MGO/ 8.71	WL/10.87
WSEC-1	70%	8.48	9.25		LSD/ 7.11	DA/ 7.60	AC/ 8.77	MGO/ 9.62	WL/11.43
WSEC-2	70%	7.75	8.15		LSD/ 6.32	DA/ 6.81	AC/ 8.27	MGO/ 8.86	WL/10.98
WSEC-3	70%	7.20	7.84		LSD/ 5.86	DA/ 6.33	AC/ 7.75	MGO/ 8.21	WL/10.43
WSEC-4	70%	7.00	7.47		LSD/ 5.81	DA/ 6.18	AC/ 7.53	MGO/ 8.00	WL/10.17

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SODA ASH COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/10.07	AC/11.22	MGO/11.97	WL/12.27
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.73	AC/ 9.47	MGO/ 9.86	WL/12.86
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.57	AC/ 6.98	MGO/ 7.24	WL/ 9.53
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.49	AC/11.39	WL/12.57	MGO/12.90
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.43	AC/10.33	MGO/10.78	WL/13.97
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.50	AC/11.55	MGO/12.80	WL/13.20
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.79	AC/ 7.13	MGO/ 7.43	WL/ 9.71
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.65	AC/11.42	MGO/11.47	WL/12.98
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.11	AC/11.91	MGO/13.08	WL/14.06
SPP-2	90%	10.77	9.46		*LSD/ 7.59	DA/10.44	AC/10.78	MGO/11.00	WL/12.56
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.67	AC/ 8.07	MGO/ 8.57	WL/10.90
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.46	AC/ 8.95	MGO/ 9.71	WL/11.76
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.05	AC/ 8.54	MGO/ 9.09	WL/11.39
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.80	AC/ 8.22	MGO/ 8.71	WL/11.03
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.74	AC/ 8.19	MGO/ 8.61	WL/10.62
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.08	AC/ 9.71	MGO/10.28	WL/12.86
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.33	AC/ 7.83	MGO/ 8.17	WL/10.30
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.72	AC/ 8.40	MGO/ 8.99	WL/10.84
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.77	AC/ 9.39	MGO/10.08	WL/12.42
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.33	AC/ 8.86	MGO/ 9.42	WL/11.58
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.63	AC/ 7.93	MGO/ 8.26	WL/10.37
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.88	AC/ 8.23	MGO/ 8.50	WL/10.82
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.53	AC/ 9.04	MGO/ 9.56	WL/12.05
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.10	AC/ 8.40	MGO/ 8.71	WL/11.14
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.63	AC/ 8.87	MGO/ 9.62	WL/11.67
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.82	AC/ 8.32	MGO/ 8.86	WL/11.21
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.34	AC/ 7.81	MGO/ 8.21	WL/10.72
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.19	AC/ 7.60	MGO/ 8.00	WL/10.50

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIKE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - HGO COST +50%

APPLICATION: RETROFIT					PLANT SIZE: 500 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.81	WL/11.99	HGO/12.07
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.43	HGO/ 9.88	WL/12.60
NAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.93	HGO/ 7.26	WL/ 9.25
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.01	WL/12.31	HGO/13.01
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.29	HGO/10.79	WL/13.73
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.17	HGO/12.90	WL/12.95
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.07	HGO/ 7.44	WL/ 9.42
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	AC/10.98	HGO/11.58	WL/12.68
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/11.50	HGO/13.18	WL/13.78
SPP-2	90%	10.77	9.46		*LSD/ 9.59	DA/10.34	AC/10.36	HGO/11.10	WL/12.28
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.02	HGO/ 8.58	WL/10.67
WSCC-2	70%	8.32	9.52		LSD/ 6.86	DA/ 7.44	AC/ 8.86	HGO/ 9.74	WL/11.53
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.42	HGO/ 9.12	WL/11.09
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.08	HGO/ 8.73	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.09	HGO/ 8.64	WL/10.36
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.61	HGO/10.30	WL/12.60
NAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.71	HGO/ 8.20	WL/10.01
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.30	HGO/ 9.02	WL/10.60
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.30	HGO/10.10	WL/12.17
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.76	HGO/ 9.44	WL/11.34
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.81	HGO/ 8.29	WL/10.07
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.12	HGO/ 8.52	WL/10.53
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.95	HGO/ 9.59	WL/11.78
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.29	HGO/ 8.74	WL/10.87
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.77	HGO/ 9.64	WL/11.43
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.27	HGO/ 8.87	WL/10.98
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.75	HGO/ 8.22	WL/10.43
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.53	HGO/ 8.01	WL/10.17

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - FUEL OIL COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST(MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/11.48	WL/11.99	MGO/13.66
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.50	MGO/10.06	WL/12.60
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 7.00	MGO/ 7.43	WL/ 9.25
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.90	WL/12.31	MGO/15.13
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.38	MGO/11.00	WL/13.73
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.93	WL/12.95	MGO/14.71
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.14	MGO/ 7.60	WL/ 9.42
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	AC/11.50	WL/12.68	MGO/12.79
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/12.18	WL/13.78	MGO/14.78
SPP-2	90%	10.77	9.46		*LSD/ 9.59	DA/10.34	AC/10.86	MGO/12.24	WL/12.28
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.11	MGO/ 8.80	WL/10.67
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 9.08	MGO/10.27	WL/11.53
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.62	MGO/ 9.58	WL/11.09
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.26	MGO/ 9.16	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.26	MGO/ 9.05	WL/10.36
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.79	MGO/10.74	WL/12.60
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.88	MGO/ 8.60	WL/10.01
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.53	MGO/ 9.57	WL/10.60
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.50	MGO/10.57	WL/12.17
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.95	MGO/ 9.91	WL/11.34
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.97	MGO/ 8.67	WL/10.07
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.25	MGO/ 8.84	WL/10.53
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 9.11	MGO/ 9.95	WL/11.78
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.42	MGO/ 9.03	WL/10.87
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.98	MGO/10.12	WL/11.43
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.39	MGO/ 9.15	WL/10.98
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.84	MGO/ 8.45	WL/10.43
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.62	MGO/ 8.24	WL/10.17

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - NAT. GAS COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.81	MGO/11.97	WL/12.13
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.43	MGO/ 9.86	WL/12.62
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.93	MGO/ 7.24	WL/ 9.28
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.01	WL/12.68	MGO/12.90
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.29	MGO/10.78	WL/13.74
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.17	MGO/12.80	WL/13.30
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.07	MGO/ 7.43	WL/ 9.44
SERC	90%	11.00	9.16		*LSD/ 9.79	DA/10.54	AC/10.98	MGO/11.47	WL/13.00
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/11.50	MGO/13.08	WL/14.07
SPP-2	90%	10.77	9.46		*LSD/ 9.59	DA/10.34	AC/10.36	MGO/11.00	WL/12.61
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.02	MGO/ 8.57	WL/10.69
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.86	MGO/ 9.71	WL/11.60
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.42	MGO/ 9.09	WL/11.19
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.08	MGO/ 8.71	WL/10.76
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.09	MGO/ 8.61	WL/10.39
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.61	MGO/10.28	WL/12.66
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.71	MGO/ 8.17	WL/10.09
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.30	MGO/ 8.99	WL/10.68
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.30	MGO/10.08	WL/12.22
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.76	MGO/ 9.42	WL/11.42
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.81	MGO/ 8.26	WL/10.15
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.12	MGO/ 8.50	WL/10.60
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.95	MGO/ 9.56	WL/11.84
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.29	MGO/ 8.71	WL/10.94
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.77	MGO/ 9.62	WL/11.50
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.27	MGO/ 8.86	WL/11.01
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.75	MGO/ 8.21	WL/10.46
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.53	MGO/ 8.00	WL/10.20

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.01	WL/11.23	MGO/11.97
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.34	MGO/ 9.86	WL/12.55
MAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.84	MGO/ 7.24	WL/ 9.20
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/10.22	WL/11.56	MGO/12.90
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.20	MGO/10.78	WL/13.68
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	AC/10.38	DA/10.41	WL/12.19	MGO/12.80
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 6.98	MGO/ 7.43	WL/ 9.37
SERC	90%	11.00	9.16		*LSD/ 9.79	AC/10.19	DA/10.54	MGO/11.47	WL/11.94
SPP-1	90%	11.60	10.75		*LSD/10.25	AC/10.71	DA/11.01	WL/13.03	MGO/13.08
SPP-2	90%	10.77	9.46		AC/ 9.57	*LSD/ 9.59	DA/10.34	MGO/11.00	WL/11.53
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 7.94	MGO/ 8.57	WL/10.62
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.66	MGO/ 9.71	WL/11.37
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.22	MGO/ 9.09	WL/10.92
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 7.89	MGO/ 8.71	WL/10.53
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 7.88	MGO/ 8.61	WL/10.20
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.40	MGO/10.28	WL/12.43
MAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.51	MGO/ 8.17	WL/ 9.84
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.09	MGO/ 8.99	WL/10.43
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.10	MGO/10.08	WL/12.02
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.55	MGO/ 9.42	WL/11.17
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.61	MGO/ 8.26	WL/ 9.91
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 7.91	MGO/ 8.50	WL/10.36
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.77	MGO/ 9.56	WL/11.64
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.09	MGO/ 8.71	WL/10.71
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.57	MGO/ 9.62	WL/11.27
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.17	MGO/ 8.86	WL/10.91
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.65	MGO/ 8.21	WL/10.37
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.42	MGO/ 8.00	WL/10.10

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-3. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 500 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILL\$/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	10.39	9.30		*LSD/ 9.18	DA/ 9.97	AC/10.81	MGO/10.87	WL/11.99
ERCOT	80%	8.82	9.14		*LSD/ 7.32	DA/ 7.72	AC/ 9.43	MGO/ 9.74	WL/12.60
HAAC	80%	6.32	6.51		*LSD/ 5.22	DA/ 5.56	AC/ 6.93	MGO/ 7.12	WL/ 9.25
MAIN	90%	9.80	9.24		*LSD/ 8.51	DA/ 9.39	AC/11.01	MGO/11.82	WL/12.31
MARCA-1	80%	9.63	10.07		*LSD/ 7.98	DA/ 8.42	AC/10.29	MGO/10.66	WL/13.73
MARCA-2	90%	10.90	10.88		*LSD/ 9.57	DA/10.41	AC/11.17	MGO/11.71	WL/12.95
NPCC	80%	6.56	6.70		*LSD/ 5.42	DA/ 5.78	AC/ 7.07	MGO/ 7.30	WL/ 9.42
SERC	90%	11.00	9.16		*LSD/ 9.79	MGO/10.39	DA/10.54	AC/10.98	WL/12.68
SPP-1	90%	11.60	10.75		*LSD/10.25	DA/11.01	AC/11.50	MGO/12.00	WL/13.78
SPP-2	90%	10.77	9.46		*LSD/ 9.59	MGO/ 9.91	DA/10.34	AC/10.36	WL/12.28
WSCC-1	80%	7.59	7.93		*LSD/ 6.31	DA/ 6.66	AC/ 8.02	MGO/ 8.45	WL/10.67
WSCC-2	70%	8.32	8.52		LSD/ 6.86	DA/ 7.44	AC/ 8.86	MGO/ 9.44	WL/11.53
WSCC-3	70%	7.82	8.37		LSD/ 6.44	DA/ 7.02	AC/ 8.42	MGO/ 8.81	WL/11.09
WSCC-4	70%	7.52	7.83		LSD/ 6.31	DA/ 6.77	AC/ 8.08	MGO/ 8.44	WL/10.69
LOW SULFUR COAL									
ECAR	70%	7.47	7.45		LSD/ 6.20	DA/ 6.72	AC/ 8.09	MGO/ 8.33	WL/10.36
ERCOT	70%	9.02	9.22		LSD/ 7.52	DA/ 8.06	AC/ 9.61	MGO/10.00	WL/12.60
HAAC	70%	7.00	7.06		LSD/ 5.81	DA/ 6.30	AC/ 7.71	MGO/ 7.89	WL/10.01
MAIN	70%	7.47	7.59		LSD/ 6.13	DA/ 6.70	AC/ 8.30	MGO/ 8.71	WL/10.60
MARCA-1	70%	8.69	9.06		LSD/ 7.18	DA/ 7.75	AC/ 9.30	MGO/ 9.81	WL/12.17
MARCA-2	70%	8.16	8.44		LSD/ 6.75	DA/ 7.31	AC/ 8.76	MGO/ 9.14	WL/11.34
NPCC	70%	7.31	7.28		LSD/ 6.12	DA/ 6.60	AC/ 7.81	MGO/ 7.99	WL/10.07
SERC	70%	7.61	7.39		LSD/ 6.34	DA/ 6.86	AC/ 8.12	MGO/ 8.21	WL/10.53
SPP-1	70%	8.43	8.55		LSD/ 7.00	DA/ 7.51	AC/ 8.95	MGO/ 9.32	WL/11.78
SPP-2	70%	7.87	7.82		LSD/ 6.51	DA/ 7.07	AC/ 8.29	MGO/ 8.44	WL/10.87
WSCC-1	70%	8.48	8.82		LSD/ 7.11	DA/ 7.60	AC/ 8.77	MGO/ 9.34	WL/11.43
WSCC-2	70%	7.75	8.02		LSD/ 6.32	DA/ 6.81	AC/ 8.27	MGO/ 8.72	WL/10.98
WSCC-3	70%	7.20	7.64		LSD/ 5.86	DA/ 6.33	AC/ 7.75	MGO/ 8.08	WL/10.43
WSCC-4	70%	7.00	7.30		LSD/ 5.81	DA/ 6.18	AC/ 7.53	MGO/ 7.85	WL/10.17

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : BASE CASE ANALYSIS

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/17.31	MGO/18.76	WL/21.80
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.53	MGO/13.88	WL/19.25
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.32	MGO/10.58	WL/15.24
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/17.46	MGO/19.69	WL/21.83
MARCA-1	80%	13.86	14.56		*LSD/11.74	DA/11.89	AC/14.68	MGO/15.06	WL/20.62
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/17.79	MGO/19.72	WL/22.69
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.50	MGO/10.80	WL/15.54
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/17.51	MGO/18.24	WL/22.66
SPP-1	90%	16.52	16.21		*LSD/13.62	DA/15.56	AC/18.20	MGO/20.08	WL/23.81
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/16.81	MGO/17.70	WL/22.05
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.70	MGO/12.19	WL/16.62
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.16	MGO/14.05	WL/18.29
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.62	MGO/13.32	WL/18.17
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.13	MGO/12.79	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.65	DA/ 9.65	AC/12.18	MGO/12.73	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.45	DA/11.43	AC/14.16	MGO/14.84	WL/19.91
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.67	MGO/12.16	WL/16.81
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.43	MGO/13.16	WL/17.24
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.73	MGO/14.52	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.05	MGO/13.73	WL/18.18
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.78	MGO/12.26	WL/16.96
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.21	MGO/12.61	WL/17.47
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.21	MGO/13.83	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.43	MGO/12.87	WL/17.74
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.07	MGO/13.94	WL/18.21
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.00	MGO/12.55	WL/17.00
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.28	MGO/11.70	WL/16.64
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.02	MGO/11.47	WL/16.75

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LIME COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	13.48	14.39		*LSD/10.83	DA/12.87	AC/17.31	MGO/18.65	WL/21.80
ERCOT	80%	12.57	13.31		*LSD/10.12	DA/10.77	AC/13.53	MGO/13.77	WL/19.25
MAAC	80%	9.19	9.77		*LSD/ 7.29	DA/ 7.95	AC/10.32	MGO/10.49	WL/15.24
MAIN	90%	13.10	14.29		*LSD/10.40	DA/12.48	AC/17.46	MGO/19.61	WL/21.83
MARCA-1	80%	13.71	14.56		*LSD/11.07	DA/11.74	AC/14.68	MGO/14.97	WL/20.62
MARCA-2	90%	14.11	16.18		*LSD/11.31	DA/13.39	AC/17.79	MGO/19.62	WL/22.69
NPCC	80%	9.41	10.02		*LSD/ 7.47	DA/ 8.14	AC/10.50	MGO/10.67	WL/15.54
SERC	90%	13.95	14.29		*LSD/11.27	DA/13.28	AC/17.51	MGO/18.11	WL/22.66
SPP-1	90%	14.95	16.21		*LSD/12.08	DA/14.06	AC/18.20	MGO/19.97	WL/23.81
SPP-2	90%	13.59	14.53		*LSD/10.96	DA/12.98	AC/16.81	MGO/17.58	WL/22.05
WSCC-1	80%	10.78	11.60		*LSD/ 8.62	DA/ 9.27	AC/11.70	MGO/12.05	WL/16.62
WSCC-2	70%	11.66	12.81		LSD/ 9.17	DA/10.22	AC/13.16	MGO/13.94	WL/18.29
WSCC-3	70%	11.03	12.33		LSD/ 8.64	DA/ 9.71	AC/12.62	MGO/13.22	WL/18.17
WSCC-4	70%	10.59	11.63		LSD/ 8.39	DA/ 9.33	AC/12.13	MGO/12.68	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.54	11.24		LSD/ 8.27	DA/ 9.29	AC/12.18	MGO/12.63	WL/17.18
ERCOT	70%	12.65	13.58		LSD/10.06	DA/11.07	AC/14.16	MGO/14.74	WL/19.91
MAAC	70%	9.96	10.70		LSD/ 7.81	DA/ 8.81	AC/11.67	MGO/12.07	WL/16.81
MAIN	70%	10.64	11.42		LSD/ 8.31	DA/ 9.37	AC/12.43	MGO/13.08	WL/17.24
MARCA-1	70%	12.26	13.32		LSD/ 9.69	DA/10.71	AC/13.73	MGO/14.43	WL/19.25
MARCA-2	70%	11.47	12.49		LSD/ 9.02	DA/10.07	AC/13.05	MGO/13.63	WL/18.18
NPCC	70%	10.17	10.95		LSD/ 7.99	DA/ 9.00	AC/11.78	MGO/12.13	WL/16.96
SERC	70%	10.63	11.18		LSD/ 8.35	DA/ 9.38	AC/12.21	MGO/12.49	WL/17.47
SPP-1	70%	11.85	12.65		LSD/ 9.39	DA/10.34	AC/13.21	MGO/13.72	WL/18.73
SPP-2	70%	10.98	11.71		LSD/ 8.60	DA/ 9.66	AC/12.43	MGO/12.75	WL/17.74
WSCC-1	70%	11.70	12.91		LSD/ 9.28	DA/10.27	AC/13.07	MGO/13.80	WL/18.21
WSCC-2	70%	11.00	11.75		LSD/ 8.65	DA/ 9.45	AC/12.00	MGO/12.44	WL/17.00
WSCC-3	70%	10.29	11.18		LSD/ 8.07	DA/ 8.85	AC/11.28	MGO/11.60	WL/16.64
WSCC-4	70%	9.98	10.77		LSD/ 7.91	DA/ 8.61	AC/11.02	MGO/11.36	WL/16.75

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LIMESTONE COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	13.80		*LSD/12.45	DA/14.27	AC/17.31	HGO/18.76	WL/21.80
ERCOT	80%	12.73	13.21		*LSD/10.30	DA/10.93	AC/13.53	HGO/13.88	WL/19.25
MAAC	80%	9.33	9.71		*LSD/ 7.45	DA/ 8.08	AC/10.32	HGO/10.58	WL/15.24
MAIN	90%	14.29	13.70		*LSD/11.71	DA/13.62	AC/17.46	HGO/19.69	WL/21.83
MARCA-1	80%	13.86	14.43		*LSD/11.24	DA/11.89	AC/14.68	HGO/15.06	WL/20.62
MARCA-2	90%	15.63	15.01		*LSD/12.97	DA/14.83	AC/17.79	HGO/19.72	WL/22.69
NPCC	80%	9.62	9.91		*LSD/ 7.70	DA/ 8.34	AC/10.50	HGO/10.80	WL/15.54
SERC	90%	15.66	13.86		*LSD/13.15	DA/14.91	AC/17.51	HGO/18.24	WL/22.66
SPP-1	90%	16.52	15.41		*LSD/13.82	DA/15.56	AC/18.20	HGO/20.08	WL/23.81
SPP-2	90%	15.33	13.79		*LSD/12.87	DA/14.64	AC/16.81	HGO/17.70	WL/22.05
WSCC-1	80%	11.01	11.40		*LSD/ 8.87	DA/ 9.48	AC/11.70	HGO/12.19	WL/16.62
WSCC-2	70%	12.06	12.34		LSD/ 9.60	DA/10.59	AC/13.16	HGO/14.05	WL/18.29
WSCC-3	70%	11.40	11.89		LSD/ 9.04	DA/10.06	AC/12.62	HGO/13.32	WL/18.17
WSCC-4	70%	10.97	11.31		LSD/ 8.81	DA/ 9.69	AC/12.13	HGO/12.79	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.09		LSD/ 8.69	DA/ 9.65	AC/12.18	HGO/12.73	WL/17.18
ERCOT	70%	13.04	13.35		LSD/10.49	DA/11.43	AC/14.16	HGO/14.84	WL/19.91
MAAC	70%	10.29	10.54		LSD/ 8.17	DA/ 9.12	AC/11.67	HGO/12.16	WL/16.81
MAIN	70%	10.95	11.27		LSD/ 8.65	DA/ 9.66	AC/12.43	HGO/13.16	WL/17.24
MARCA-1	70%	12.60	13.03		LSD/10.06	DA/11.03	AC/13.73	HGO/14.52	WL/19.25
MARCA-2	70%	11.86	12.19		LSD/ 9.45	DA/10.44	AC/13.05	HGO/13.73	WL/18.18
NPCC	70%	10.64	10.70		LSD/ 8.51	DA/ 9.44	AC/11.78	HGO/12.26	WL/16.96
SERC	70%	11.07	11.07		LSD/ 8.84	DA/ 9.80	AC/12.21	HGO/12.61	WL/17.47
SPP-1	70%	12.20	12.47		LSD/ 9.78	DA/10.67	AC/13.21	HGO/13.83	WL/18.73
SPP-2	70%	11.42	11.52		LSD/ 9.08	DA/10.08	AC/12.43	HGO/12.87	WL/17.74
WSCC-1	70%	12.22	12.45		LSD/ 9.85	DA/10.76	AC/13.07	HGO/13.94	WL/18.21
WSCC-2	70%	11.21	11.61		LSD/ 8.88	DA/ 9.65	AC/12.00	HGO/12.55	WL/17.00
WSCC-3	70%	10.47	10.97		LSD/ 8.26	DA/ 9.01	AC/11.28	HGO/11.70	WL/16.64
WSCC-4	70%	10.18	10.60		LSD/ 8.14	DA/ 8.81	AC/11.02	HGO/11.47	WL/16.75

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SODA ASH COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		#LSD/12.45	DA/14.16	AC/16.87	MGO/18.76	WL/20.50
ERCOT	80%	12.73	13.31		#LSD/10.30	DA/10.92	AC/13.48	MGO/13.88	WL/18.03
HAAC	80%	9.33	9.77		#LSD/ 7.45	DA/ 8.07	AC/10.26	MGO/10.58	WL/13.90
MAIN	90%	14.29	14.29		#LSD/11.71	DA/13.52	AC/17.06	MGO/19.69	WL/20.62
MARCA-1	80%	13.86	14.56		#LSD/11.24	DA/11.88	AC/14.63	MGO/15.06	WL/19.47
MARCA-2	90%	15.63	16.13		#LSD/12.97	DA/14.73	AC/17.38	MGO/19.72	WL/21.47
NPCC	80%	9.62	10.02		#LSD/ 7.70	DA/ 8.32	AC/10.45	MGO/10.80	WL/14.15
SERC	90%	15.66	14.29		#LSD/13.15	DA/14.79	AC/17.03	MGO/18.24	WL/21.24
SPP-1	90%	16.52	16.21		#LSD/13.82	DA/15.45	AC/17.77	MGO/20.08	WL/22.51
SPP-2	90%	15.33	14.53		#LSD/12.87	DA/14.53	AC/16.36	MGO/17.70	WL/20.71
WSCC-1	80%	11.01	11.60		#LSD/ 8.87	DA/ 9.47	AC/11.66	MGO/12.19	WL/15.53
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.57	AC/13.07	MGO/14.05	WL/17.19
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.03	AC/12.50	MGO/13.32	WL/16.76
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.66	AC/11.99	MGO/12.79	WL/16.37
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.62	AC/12.06	MGO/12.73	WL/15.94
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.40	AC/14.05	MGO/14.84	WL/18.65
HAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.09	AC/11.54	MGO/12.16	WL/15.42
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.64	AC/12.32	MGO/13.16	WL/16.08
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.00	AC/13.62	MGO/14.52	WL/18.07
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.41	AC/12.95	MGO/13.73	WL/17.02
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.41	AC/11.66	MGO/12.26	WL/15.53
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.77	AC/12.09	MGO/12.61	WL/16.11
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.65	AC/13.12	MGO/13.83	WL/17.49
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.05	AC/12.32	MGO/12.87	WL/16.46
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.74	AC/12.97	MGO/13.94	WL/17.10
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.64	AC/11.95	MGO/12.55	WL/15.92
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.00	AC/11.22	MGO/11.70	WL/15.27
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.79	AC/10.95	MGO/11.47	WL/15.16

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - HGO COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL	LIME	LINE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
	REQUIRED		STONE		1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/17.31	HGO/18.64	WL/21.80
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.53	HGO/13.87	WL/19.25
HAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.32	HGO/10.56	WL/15.24
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/17.46	HGO/19.58	WL/21.83
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.68	HGO/15.05	WL/20.62
MARCA-2	90%	15.63	16.18		*LSD/12.77	DA/14.83	AC/17.79	HGO/19.61	WL/22.69
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.50	HGO/10.79	WL/15.54
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/17.51	HGO/18.12	WL/22.66
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/18.20	HGO/19.98	WL/23.81
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/16.81	HGO/17.59	WL/22.05
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.70	HGO/12.18	WL/16.62
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.16	HGO/14.02	WL/18.29
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.62	HGO/13.30	WL/18.17
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.13	HGO/12.77	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.67	DA/ 9.65	AC/12.18	HGO/12.70	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.16	HGO/14.81	WL/19.91
HAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.67	HGO/12.13	WL/16.81
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.43	HGO/13.13	WL/17.24
MARCA-1	70%	12.60	13.32		LSD/10.04	DA/11.03	AC/13.73	HGO/14.50	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.05	HGO/13.71	WL/18.18
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.78	HGO/12.23	WL/16.96
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.21	HGO/12.58	WL/17.47
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.21	HGO/13.80	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.43	HGO/12.84	WL/17.74
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.07	HGO/13.92	WL/18.21
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.00	HGO/12.54	WL/17.00
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.28	HGO/11.69	WL/16.64
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.02	HGO/11.46	WL/16.75

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - FUEL OIL COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/16.59	HGO/16.96	WL/21.80
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.45	HGO/13.67	WL/19.25
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.24	HGO/10.38	WL/15.24
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/16.52	HGO/17.33	WL/21.83
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.58	HGO/14.83	WL/20.62
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/16.98	HGO/17.70	WL/22.69
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.43	HGO/10.61	WL/15.54
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	HGO/16.84	AC/16.95	WL/22.66
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/17.48	HGO/18.27	WL/23.81
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/16.28	HGO/16.38	WL/22.05
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.61	HGO/11.96	WL/16.62
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/12.93	HGO/13.46	WL/18.29
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.42	HGO/12.80	WL/18.17
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/11.94	HGO/12.31	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/11.99	HGO/12.27	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/13.97	HGO/14.36	WL/19.91
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.49	HGO/11.71	WL/16.81
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.18	HGO/12.55	WL/17.24
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.52	HGO/14.00	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/12.85	HGO/13.21	WL/18.18
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.61	HGO/11.83	WL/16.96
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.07	HGO/12.24	WL/17.47
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.05	HGO/13.42	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.30	HGO/12.53	WL/17.74
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/12.85	HGO/13.40	WL/18.21
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/11.88	HGO/12.24	WL/17.00
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.18	HGO/11.45	WL/16.64
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/10.92	HGO/11.20	WL/16.75

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - NAT. GAS COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/17.31	MGO/18.76	WL/21.68
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.53	MGO/13.88	WL/19.29
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.32	MGO/10.58	WL/15.29
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/17.46	MGO/19.69	WL/21.51
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.68	MGO/15.06	WL/20.64
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/17.79	MGO/19.72	WL/22.38
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.50	MGO/10.80	WL/15.58
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/17.51	MGO/18.24	WL/22.39
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/18.20	MGO/20.08	WL/23.56
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/16.81	MGO/17.70	WL/21.77
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.70	MGO/12.19	WL/16.65
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.16	MGO/14.05	WL/18.28
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.62	MGO/13.32	WL/18.15
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.13	MGO/12.79	WL/17.98
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/12.18	MGO/12.73	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.16	MGO/14.84	WL/19.89
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.67	MGO/12.16	WL/16.79
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.43	MGO/13.16	WL/17.22
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.73	MGO/14.52	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.05	MGO/13.73	WL/18.17
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.78	MGO/12.26	WL/16.95
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.21	MGO/12.61	WL/17.46
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.21	MGO/13.83	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.43	MGO/12.87	WL/17.73
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.07	MGO/13.94	WL/18.20
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.00	MGO/12.55	WL/17.04
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.28	MGO/11.70	WL/16.69
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.02	MGO/11.47	WL/16.78

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/18.16	MGO/18.76	WL/22.45
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.63	MGO/13.88	WL/19.17
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.41	MGO/10.58	WL/15.16
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/18.31	MGO/19.69	WL/22.48
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.77	MGO/15.06	WL/20.53
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/18.63	MGO/19.72	WL/23.33
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.59	MGO/10.80	WL/15.45
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	MGO/18.24	AC/18.35	WL/23.30
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/19.04	MGO/20.08	WL/24.46
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/17.65	MGO/17.70	WL/22.70
WSEC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.79	MGO/12.19	WL/16.53
WSEC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.38	MGO/14.05	WL/18.31
WSEC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.84	MGO/13.32	WL/18.19
WSEC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.34	MGO/12.79	WL/18.01
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/12.39	MGO/12.73	WL/17.21
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.38	MGO/14.84	WL/19.94
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.88	MGO/12.16	WL/16.84
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.65	MGO/13.16	WL/17.27
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.94	MGO/14.52	WL/19.27
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.27	MGO/13.73	WL/18.21
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/12.00	MGO/12.26	WL/16.98
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.43	MGO/12.61	WL/17.50
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.40	MGO/13.83	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.64	MGO/12.87	WL/17.77
WSEC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.28	MGO/13.94	WL/18.24
WSEC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.11	MGO/12.55	WL/16.93
WSEC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.38	MGO/11.70	WL/16.56
WSEC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.14	MGO/11.47	WL/16.66

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/17.31	MGO/19.92	WL/21.80
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.53	MGO/14.01	WL/19.25
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.32	MGO/10.71	WL/15.24
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/17.46	MGO/20.84	WL/21.83
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.68	MGO/15.19	WL/20.62
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/17.79	MGO/20.88	WL/22.69
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.50	MGO/10.93	WL/15.54
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/17.51	MGO/19.38	WL/22.66
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/18.20	MGO/21.23	WL/23.81
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/16.81	MGO/18.85	WL/22.05
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.70	MGO/12.32	WL/16.62
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.16	MGO/14.34	WL/18.29
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.62	MGO/13.62	WL/18.17
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.13	MGO/13.08	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/12.18	MGO/13.03	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.16	MGO/15.14	WL/19.91
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.67	MGO/12.46	WL/16.81
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.43	MGO/13.46	WL/17.24
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.73	MGO/14.81	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.05	MGO/14.03	WL/18.18
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.78	MGO/12.56	WL/16.96
SERC	70%	11.07	11.18		LSD/ 8.34	DA/ 9.80	AC/12.21	MGO/12.91	WL/17.47
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.21	MGO/14.09	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.43	MGO/13.16	WL/17.74
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.07	MGO/14.23	WL/18.21
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.00	MGO/12.70	WL/17.00
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.28	MGO/11.84	WL/16.64
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.02	MGO/11.63	WL/16.75

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIKE SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS -- SO2 ABSORPTION UNIT COST -50%

APPLICATION: RETROFIT					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	13.02	12.36		*LSD/ 9.42	DA/12.65	AC/15.36	MGO/17.66	WL/20.12
ERCOT	80%	10.05	10.48		*LSD/ 6.17	DA/ 8.63	AC/10.76	MGO/12.33	WL/16.88
HAAC	80%	7.48	7.82		*LSD/ 4.57	DA/ 6.53	AC/ 8.45	MGO/ 9.53	WL/13.64
MAIN	90%	12.38	12.27		*LSD/ 8.71	DA/12.01	AC/15.53	MGO/18.61	WL/20.17
MARCA-1	80%	10.90	11.44		*LSD/ 6.68	DA/ 9.33	AC/11.61	MGO/13.35	WL/17.98
MARCA-2	90%	13.56	14.00		*LSD/ 9.73	DA/13.08	AC/15.69	MGO/18.55	WL/20.88
NPCC	80%	7.73	8.02		*LSD/ 4.76	DA/ 6.75	AC/ 8.59	MGO/ 9.73	WL/13.89
SERC	90%	13.65	12.17		*LSD/10.00	DA/13.22	AC/15.47	MGO/17.10	WL/20.91
SPP-1	90%	14.22	13.78		*LSD/10.23	DA/13.61	AC/15.85	MGO/18.76	WL/21.79
SPP-2	90%	13.42	12.52		*LSD/ 9.88	DA/13.04	AC/14.88	MGO/16.62	WL/20.40
WSCC-1	80%	8.77	9.24		*LSD/ 5.42	DA/ 7.59	AC/ 9.42	MGO/10.92	WL/14.66
WSCC-2	70%	9.78	10.20		LSD/ 6.09	DA/ 8.66	AC/10.84	MGO/12.75	WL/16.29
WSCC-3	70%	9.28	10.09		LSD/ 5.77	DA/ 8.27	AC/10.47	MGO/12.12	WL/16.31
WSCC-4	70%	8.95	9.49		LSD/ 5.68	DA/ 7.99	AC/10.08	MGO/11.64	WL/16.22
LOW SULFUR COAL									
ECAR	70%	8.92	9.13		LSD/ 5.60	DA/ 7.97	AC/10.15	MGO/11.60	WL/15.45
ERCOT	70%	10.52	10.93		LSD/ 6.61	DA/ 9.28	AC/11.57	MGO/13.39	WL/17.68
HAAC	70%	8.42	8.72		LSD/ 5.28	DA/ 7.55	AC/ 9.78	MGO/11.11	WL/15.19
MAIN	70%	8.91	9.28		LSD/ 5.50	DA/ 7.95	AC/10.36	MGO/12.00	WL/15.46
MARCA-1	70%	10.15	10.75		LSD/ 6.30	DA/ 8.95	AC/11.22	MGO/13.12	WL/17.10
MARCA-2	70%	9.64	10.15		LSD/ 6.02	DA/ 8.56	AC/10.79	MGO/12.47	WL/16.24
NPCC	70%	8.76	8.96		LSD/ 5.60	DA/ 7.86	AC/ 9.88	MGO/11.20	WL/15.32
SERC	70%	9.07	9.07		LSD/ 5.75	DA/ 8.12	AC/10.18	MGO/11.47	WL/15.73
SPP-1	70%	9.85	10.16		LSD/ 6.15	DA/ 8.67	AC/10.80	MGO/12.48	WL/16.66
SPP-2	70%	9.32	9.49		LSD/ 5.84	DA/ 8.31	AC/10.30	MGO/11.67	WL/15.91
WSCC-1	70%	9.96	10.54		LSD/ 6.37	DA/ 8.85	AC/10.76	MGO/12.65	WL/16.24
WSCC-2	70%	8.93	9.34		LSD/ 5.37	DA/ 7.71	AC/ 9.67	MGO/11.25	WL/15.00
WSCC-3	70%	8.34	8.94		LSD/ 4.99	DA/ 7.22	AC/ 9.11	MGO/10.49	WL/14.78
WSCC-4	70%	8.15	8.63		LSD/ 5.02	DA/ 7.09	AC/ 8.96	MGO/10.32	WL/14.98

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - REGENERATION UNIT COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.19	AC/14.80	MGO/16.49	WL/19.26
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.91	AC/12.82	MGO/13.23	WL/18.53
HAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.06	AC/ 9.60	MGO/ 9.93	WL/14.52
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.54	AC/14.97	MGO/17.44	WL/19.30
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.87	AC/13.96	MGO/14.42	WL/19.89
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.75	AC/15.29	MGO/17.47	WL/20.15
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.32	AC/ 9.79	MGO/10.16	WL/14.81
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.83	AC/15.01	MGO/15.98	WL/20.13
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.48	AC/15.70	MGO/17.83	WL/21.28
SPP-2	90%	15.33	14.53		*LSD/12.87	AC/14.31	DA/14.56	MGO/15.44	WL/19.52
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.46	AC/10.98	MGO/11.55	WL/15.89
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.56	AC/12.03	MGO/13.02	WL/17.14
WSCC-3	70%	11.40	12.33		LSR/ 9.04	DA/10.03	AC/11.47	MGO/12.28	WL/17.00
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.66	AC/11.00	MGO/11.77	WL/16.83
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.62	AC/11.02	MGO/11.69	WL/16.01
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.40	AC/13.00	MGO/13.80	WL/18.73
HAAC	70%	10.29	10.70		LSR/ 8.17	DA/ 9.08	AC/10.52	MGO/11.13	WL/15.64
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.63	AC/11.27	MGO/12.12	WL/16.06
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.00	AC/12.60	MGO/13.51	WL/18.11
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.41	AC/11.90	MGO/12.69	WL/17.01
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.41	AC/10.64	MGO/11.23	WL/15.80
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.77	AC/11.05	MGO/11.56	WL/16.30
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.64	AC/12.14	MGO/12.86	WL/17.65
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.05	AC/11.29	MGO/11.84	WL/16.59
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.73	AC/11.92	MGO/12.91	WL/17.06
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.63	AC/11.21	MGO/11.84	WL/16.20
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 8.99	AC/10.52	MGO/11.02	WL/15.87
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.78	AC/10.22	MGO/10.74	WL/15.93

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID UNIT COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	MGO/17.27	AC/17.31	WL/21.80
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.53	MGO/13.55	WL/19.25
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	MGO/10.25	AC/10.32	WL/15.24
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/17.46	MGO/18.21	WL/21.83
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.68	MGO/14.74	WL/20.62
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/17.79	MGO/18.24	WL/22.69
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	MGO/10.47	AC/10.50	WL/15.54
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	MGO/16.76	AC/17.51	WL/22.66
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/18.20	MGO/18.60	WL/23.81
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	MGO/16.22	AC/16.81	WL/22.05
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.70	MGO/11.87	WL/16.62
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.16	MGO/13.48	WL/18.29
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.62	MGO/12.74	WL/18.17
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.13	MGO/12.22	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	MGO/12.15	AC/12.18	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.16	MGO/14.26	WL/19.91
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	MGO/11.58	AC/11.67	WL/16.81
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.43	MGO/12.57	WL/17.24
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.73	MGO/13.96	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.05	MGO/13.15	WL/18.18
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	MGO/11.69	AC/11.78	WL/16.96
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	MGO/12.02	AC/12.21	WL/17.47
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.21	MGO/13.29	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	MGO/12.29	AC/12.43	WL/17.74
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.07	MGO/13.36	WL/18.21
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.00	MGO/12.18	WL/17.00
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.28	MGO/11.35	WL/16.64
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.02	MGO/11.09	WL/16.75

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR UNIT COST -50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/16.54	MGO/18.76	WL/19.92
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.37	MGO/13.88	WL/18.85
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.15	MGO/10.58	WL/14.84
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/16.70	MGO/19.69	WL/19.96
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.51	MGO/15.06	WL/20.22
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/17.02	MGO/19.72	WL/20.82
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.34	MGO/10.80	WL/15.13
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/16.74	MGO/18.24	WL/20.79
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/17.44	MGO/20.08	WL/21.95
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/16.04	MGO/17.70	WL/20.19
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.54	MGO/12.19	WL/16.22
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/12.87	MGO/14.05	WL/17.58
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.33	MGO/13.32	WL/17.45
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/11.84	MGO/12.79	WL/17.28
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/11.88	MGO/12.73	WL/16.46
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/13.86	MGO/14.84	WL/19.18
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.37	MGO/12.16	WL/16.09
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.13	MGO/13.16	WL/16.51
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.44	MGO/14.52	WL/18.55
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/12.76	MGO/13.73	WL/17.46
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.49	MGO/12.26	WL/16.74
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/11.91	MGO/12.61	WL/16.74
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/12.94	MGO/13.83	WL/18.07
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.14	MGO/12.87	WL/17.03
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/12.77	MGO/13.94	WL/17.50
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/11.81	MGO/12.55	WL/16.55
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.10	MGO/11.70	WL/16.21
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/10.83	MGO/11.47	WL/16.28

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LINE COST +50%

APPLICATION: RETROFIT					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LINE	LINE- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	16.43	14.39		*LSD/14.07	DA/15.67	AC/17.31	MGO/18.86	WL/21.80
ERCOT	80%	12.90	13.31		*LSD/10.49	DA/11.09	AC/13.53	MGO/13.98	WL/19.25
MAAC	80%	9.48	9.77		*LSD/ 7.61	DA/ 8.22	AC/10.32	MGO/10.67	WL/15.24
MAIN	90%	15.48	14.29		*LSD/13.02	DA/14.75	AC/17.46	MGO/19.77	WL/21.83
MARCA-1	80%	14.01	14.56		*LSD/11.41	DA/12.03	AC/14.68	MGO/15.16	WL/20.62
MARCA-2	90%	17.14	16.18		*LSD/14.64	DA/16.26	AC/17.79	MGO/19.83	WL/22.69
NPCC	80%	9.83	10.02		*LSD/ 7.92	DA/ 8.53	AC/10.50	MGO/10.93	WL/15.54
SERC	90%	17.37	14.29		*LSD/15.03	DA/16.53	AC/17.51	MGO/18.36	WL/22.66
SPP-1	90%	18.09	15.21		*LSD/15.55	DA/17.06	AC/18.20	MGO/20.19	WL/23.81
SPP-2	90%	17.06	14.53		*LSD/14.79	DA/16.29	AC/16.81	MGO/17.82	WL/22.05
WSCC-1	80%	11.23	11.60		*LSD/ 9.12	DA/ 9.70	AC/11.70	MGO/12.34	WL/16.62
WSCC-2	70%	12.45	12.61		LSD/10.04	DA/10.97	AC/13.16	MGO/14.16	WL/18.29
WSCC-3	70%	11.77	12.33		LSD/ 9.45	DA/10.41	AC/12.62	MGO/13.42	WL/18.17
WSCC-4	70%	11.35	11.63		LSD/ 9.22	DA/10.05	AC/12.13	MGO/12.90	WL/17.99
LOW SULFUR COAL									
ECAR	70%	11.29	11.24		LSD/ 9.10	DA/10.01	AC/12.18	MGO/12.83	WL/17.18
ERCOT	70%	13.42	13.58		LSD/10.91	DA/11.80	AC/14.16	MGO/14.94	WL/19.91
MAAC	70%	10.62	10.70		LSD/ 8.53	DA/ 9.43	AC/11.67	MGO/12.25	WL/16.81
MAIN	70%	11.26	11.42		LSD/ 8.99	DA/ 9.96	AC/12.43	MGO/13.24	WL/17.24
MARCA-1	70%	12.94	13.32		LSD/10.43	DA/11.35	AC/13.73	MGO/14.62	WL/19.25
MARCA-2	70%	12.25	12.49		LSD/ 9.87	DA/10.81	AC/13.05	MGO/13.84	WL/18.18
NPCC	70%	11.11	10.95		LSD/ 9.03	DA/ 9.89	AC/11.78	MGO/12.39	WL/16.96
SERC	70%	11.52	11.18		LSD/ 9.33	DA/10.23	AC/12.21	MGO/12.73	WL/17.47
SPP-1	70%	12.56	12.65		LSD/10.17	DA/11.01	AC/13.21	MGO/13.94	WL/18.73
SPP-2	70%	11.84	11.71		LSD/ 9.57	DA/10.50	AC/12.43	MGO/12.99	WL/17.74
WSCC-1	70%	12.74	12.91		LSD/10.42	DA/11.25	AC/13.07	MGO/14.08	WL/18.21
WSCC-2	70%	11.42	11.75		LSD/ 9.11	DA/ 9.85	AC/12.00	MGO/12.66	WL/17.00
WSCC-3	70%	10.65	11.18		LSD/ 8.46	DA/ 9.18	AC/11.28	MGO/11.80	WL/16.64
WSCC-4	70%	10.39	10.77		LSD/ 8.37	DA/ 9.00	AC/11.02	MGO/11.57	WL/16.75

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - LIMESTONE COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.99		*LSD/12.45	DA/14.27	AC/17.31	MGO/18.76	WL/21.80
ERCOT	80%	12.73	13.41		*LSD/10.30	DA/10.93	AC/13.53	MGO/13.88	WL/19.25
MAAC	80%	9.33	9.84		*LSD/ 7.45	DA/ 8.08	AC/10.32	MGO/10.58	WL/15.24
MAIN	90%	14.29	14.88		*LSD/11.71	DA/13.62	AC/17.46	MGO/19.69	WL/21.83
MARCA-1	80%	13.86	14.69		*LSD/11.24	DA/11.89	AC/14.68	MGO/15.06	WL/20.62
MARCA-2	90%	15.63	17.36		*LSD/12.97	DA/14.83	AC/17.79	MGO/19.72	WL/22.69
NPCC	80%	9.62	10.13		*LSD/ 7.70	DA/ 8.34	AC/10.50	MGO/10.80	WL/15.54
SERC	90%	15.66	14.72		*LSD/13.15	DA/14.91	AC/17.51	MGO/18.24	WL/22.66
SFP-1	90%	16.52	17.01		*LSD/13.82	DA/15.56	AC/18.20	MGO/20.08	WL/23.81
SFP-2	90%	15.33	15.28		*LSD/12.87	DA/14.64	AC/16.81	MGO/17.70	WL/22.05
WSCC-1	80%	11.01	11.80		*LSD/ 8.87	DA/ 9.48	AC/11.70	MGO/12.19	WL/16.62
WSCC-2	70%	12.06	12.88		LSD/ 9.60	DA/10.59	AC/13.16	MGO/14.05	WL/18.29
WSCC-3	70%	11.40	12.77		LSD/ 9.04	DA/10.06	AC/12.62	MGO/13.32	WL/18.17
WSCC-4	70%	10.97	11.95		LSD/ 8.81	DA/ 9.69	AC/12.13	MGO/12.79	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.39		LSD/ 8.69	DA/ 9.65	AC/12.18	MGO/12.73	WL/17.18
ERCOT	70%	13.04	13.82		LSD/10.49	DA/11.43	AC/14.16	MGO/14.84	WL/19.91
MAAC	70%	10.29	10.85		LSD/ 8.17	DA/ 9.12	AC/11.67	MGO/12.16	WL/16.81
MAIN	70%	10.95	11.58		LSD/ 8.65	DA/ 9.66	AC/12.43	MGO/13.16	WL/17.24
MARCA-1	70%	12.60	13.61		LSD/10.06	DA/11.03	AC/13.73	MGO/14.52	WL/19.25
MARCA-2	70%	11.86	12.80		LSD/ 9.45	DA/10.44	AC/13.05	MGO/13.73	WL/18.18
NPCC	70%	10.64	11.19		LSD/ 8.51	DA/ 9.44	AC/11.78	MGO/12.26	WL/16.96
SERC	70%	11.07	11.29		LSD/ 8.84	DA/ 9.80	AC/12.21	MGO/12.61	WL/17.47
SFP-1	70%	12.20	12.83		LSD/ 9.78	DA/10.67	AC/13.21	MGO/13.83	WL/18.73
SFP-2	70%	11.42	11.90		LSD/ 9.08	DA/10.08	AC/12.43	MGO/12.87	WL/17.74
WSCC-1	70%	12.22	13.37		LSD/ 9.85	DA/10.76	AC/13.07	MGO/13.94	WL/18.21
WSCC-2	70%	11.21	11.89		LSD/ 8.88	DA/ 9.65	AC/12.00	MGO/12.55	WL/17.00
WSCC-3	70%	10.47	11.39		LSD/ 8.26	DA/ 9.01	AC/11.28	MGO/11.70	WL/16.64
WSCC-4	70%	10.18	10.95		LSD/ 8.14	DA/ 8.81	AC/11.02	MGO/11.47	WL/16.75

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SODA ASH COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.38	AC/17.75	MGO/18.76	WL/23.11
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.94	AC/13.58	MGO/13.88	WL/20.48
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.09	AC/10.37	MGO/10.58	WL/16.59
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.71	AC/17.87	MGO/19.69	WL/23.04
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.90	AC/14.72	MGO/15.06	WL/21.77
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.93	AC/18.19	MGO/19.72	WL/23.91
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.35	AC/10.56	MGO/10.80	WL/16.92
SERC	90%	15.66	14.29		*LSD/13.15	DA/15.02	AC/17.98	MGO/18.24	WL/24.08
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.67	AC/18.63	MGO/20.08	WL/25.12
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.75	AC/17.26	MGO/17.70	WL/23.40
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.49	AC/11.74	MGO/12.19	WL/17.70
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.62	AC/13.26	MGO/14.05	WL/19.39
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.09	AC/12.75	MGO/13.32	WL/19.57
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.73	AC/12.27	MGO/12.79	WL/19.60
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.68	AC/12.29	MGO/12.73	WL/18.43
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.46	AC/14.27	MGO/14.84	WL/21.16
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.15	AC/11.79	MGO/12.16	WL/18.19
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.69	AC/12.53	MGO/13.16	WL/18.39
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.05	AC/13.83	MGO/14.52	WL/20.44
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.47	AC/13.16	MGO/13.73	WL/19.35
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.48	AC/11.91	MGO/12.26	WL/18.39
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.83	AC/12.33	MGO/12.61	WL/18.83
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.70	AC/13.31	MGO/13.83	WL/19.97
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.11	AC/12.55	MGO/12.87	WL/19.03
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.78	AC/13.17	MGO/13.94	WL/19.33
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.66	AC/12.05	MGO/12.55	WL/18.08
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.03	AC/11.34	MGO/11.70	WL/18.01
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.82	AC/11.10	MGO/11.47	WL/18.34

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - MGO COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LINE	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/17.31	MGO/18.87	WL/21.80
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.53	MGO/13.89	WL/19.25
HAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.32	MGO/10.59	WL/15.24
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/17.46	MGO/19.80	WL/21.83
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.68	MGO/15.08	WL/20.62
MARCA-2	90%	15.63	16.18		*LSD/12.77	DA/14.83	AC/17.79	MGO/19.83	WL/22.69
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.50	MGO/10.81	WL/15.54
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/17.51	MGO/18.35	WL/22.66
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/18.20	MGO/20.18	WL/23.81
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/16.81	MGO/17.81	WL/22.05
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.70	MGO/12.20	WL/16.62
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.16	MGO/14.07	WL/18.29
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.62	MGO/13.35	WL/18.17
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.13	MGO/12.81	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/12.18	MGO/12.76	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.16	MGO/14.87	WL/19.91
HAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.67	MGO/12.19	WL/16.81
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.43	MGO/13.19	WL/17.24
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.73	MGO/14.55	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.05	MGO/13.76	WL/18.18
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.78	MGO/12.29	WL/16.96
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.21	MGO/12.64	WL/17.47
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.21	MGO/13.85	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.43	MGO/12.90	WL/17.74
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.07	MGO/13.96	WL/18.21
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.00	MGO/12.56	WL/17.00
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.28	MGO/11.71	WL/16.64
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.02	MGO/11.48	WL/16.75

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WEILMAN LORD
AC - AQUEOUS CARBONATE LSD - LINE SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - FUEL OIL COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/18.03	MGO/20.56	WL/21.80
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.61	MGO/14.09	WL/19.25
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.39	MGO/10.77	WL/15.24
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/18.40	WL/21.83	MGO/22.05
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.77	MGO/15.30	WL/20.62
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/18.59	MGO/21.75	WL/22.69
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.58	MGO/10.99	WL/15.54
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/18.06	MGO/19.63	WL/22.66
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/18.92	MGO/21.88	WL/23.81
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/17.33	MGO/19.02	WL/22.05
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.79	MGO/12.43	WL/16.62
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.40	MGO/14.64	WL/18.29
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.83	MGO/13.84	WL/18.17
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.32	MGO/13.27	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/12.36	MGO/13.19	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.35	MGO/15.33	WL/19.91
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.85	MGO/12.62	WL/16.81
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.67	MGO/13.77	WL/17.24
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.94	MGO/15.05	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.26	MGO/14.25	WL/18.18
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.95	MGO/12.70	WL/16.96
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.36	MGO/12.97	WL/17.47
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.38	MGO/14.23	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.56	MGO/13.20	WL/17.74
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.28	MGO/14.48	WL/18.21
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.12	MGO/12.86	WL/17.00
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.38	MGO/11.95	WL/16.64
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.13	MGO/11.73	WL/16.75

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - NAT. GAS COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/17.31	MGO/18.76	WL/21.92
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.53	MGO/13.88	WL/19.22
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.32	MGO/10.58	WL/15.20
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/17.46	MGO/19.69	WL/22.15
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.68	MGO/15.06	WL/20.59
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/17.79	MGO/19.72	WL/22.99
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.50	MGO/10.80	WL/15.49
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/17.51	MGO/18.24	WL/22.92
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/18.20	MGO/20.08	WL/24.06
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/16.81	MGO/17.70	WL/22.34
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.70	MGO/12.19	WL/16.58
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.16	MGO/14.05	WL/18.30
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.62	MGO/13.32	WL/18.18
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.13	MGO/12.79	WL/18.00
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/12.18	MGO/12.73	WL/17.19
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.16	MGO/14.84	WL/19.92
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.67	MGO/12.16	WL/16.82
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.43	MGO/13.16	WL/17.25
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.73	MGO/14.52	WL/19.26
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.05	MGO/13.73	WL/18.20
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.78	MGO/12.26	WL/16.97
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.21	MGO/12.61	WL/17.48
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.21	MGO/13.83	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.43	MGO/12.87	WL/17.76
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.07	MGO/13.94	WL/18.23
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.00	MGO/12.55	WL/16.97
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.28	MGO/11.70	WL/16.59
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.02	MGO/11.47	WL/16.72

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - SULFUR COST +50%

APPLICATION: RETROFIT					PLANT SIZE: 100 MW				
REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.94	14.39		*LSD/12.45	DA/14.27	AC/16.46	MGO/18.76	WL/21.15
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.44	MGO/13.88	WL/19.34
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.22	MGO/10.58	WL/15.33
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/16.62	MGO/19.69	WL/21.18
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.58	MGO/15.06	WL/20.71
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/16.94	MGO/19.72	WL/22.04
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.41	MGO/10.80	WL/15.62
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	AC/16.67	MGO/18.24	WL/22.01
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/17.36	MGO/20.08	WL/23.17
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	AC/15.96	MGO/17.70	WL/21.41
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.61	MGO/12.19	WL/16.71
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/12.95	MGO/14.05	WL/18.27
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.41	MGO/13.32	WL/18.14
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/11.92	MGO/12.79	WL/17.96
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/11.96	MGO/12.73	WL/17.15
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/13.94	MGO/14.84	WL/19.87
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.45	MGO/12.16	WL/16.78
MAIN	70%	10.93	11.42		LSD/ 8.65	DA/ 9.66	AC/12.21	MGO/13.16	WL/17.21
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.52	MGO/14.52	WL/19.23
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/12.84	MGO/13.73	WL/18.15
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.57	MGO/12.26	WL/16.93
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/11.99	MGO/12.61	WL/17.44
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.02	MGO/13.83	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.22	MGO/12.87	WL/17.72
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/12.85	MGO/13.94	WL/18.19
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/11.89	MGO/12.55	WL/17.07
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.18	MGO/11.70	WL/16.72
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/10.91	MGO/11.47	WL/16.82

*GREATER THAN 70% SO₂ REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI MGO - MAGNESIA SLURRY WL - WELLMAN LORD
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

TABLE H-4. FGD SYSTEMS RANKED BY TOTAL LEVELIZED COST : SENSITIVITY ANALYSIS - ACID COST +50%

APPLICATION: RETROFIT

PLANT SIZE: 100 MW

REGION	REMOVAL REQUIRED	LIME	LIME- STONE	RANK>	FGD SYSTEM/LEVELIZED TOTAL COST (MILLS/KWH)				
					1	2	3	4	5
HIGH SULFUR COAL									
ECAR	90%	14.96	14.39		*LSD/12.45	DA/14.27	AC/17.31	HGO/17.59	WL/21.80
ERCOT	80%	12.73	13.31		*LSD/10.30	DA/10.93	AC/13.53	HGO/13.75	WL/19.25
MAAC	80%	9.33	9.77		*LSD/ 7.45	DA/ 8.08	AC/10.32	HGO/10.45	WL/15.24
MAIN	90%	14.29	14.29		*LSD/11.71	DA/13.62	AC/17.46	HGO/18.54	WL/21.83
MARCA-1	80%	13.86	14.56		*LSD/11.24	DA/11.89	AC/14.68	HGO/14.94	WL/20.62
MARCA-2	90%	15.63	16.18		*LSD/12.97	DA/14.83	AC/17.79	HGO/18.57	WL/22.69
NPCC	80%	9.62	10.02		*LSD/ 7.70	DA/ 8.34	AC/10.50	HGO/10.67	WL/15.54
SERC	90%	15.66	14.29		*LSD/13.15	DA/14.91	HGO/17.09	AC/17.51	WL/22.66
SPP-1	90%	16.52	16.21		*LSD/13.82	DA/15.56	AC/18.20	HGO/18.93	WL/23.81
SPP-2	90%	15.33	14.53		*LSD/12.87	DA/14.64	HGO/16.54	AC/16.81	WL/22.05
WSCC-1	80%	11.01	11.60		*LSD/ 8.87	DA/ 9.48	AC/11.70	HGO/12.06	WL/16.62
WSCC-2	70%	12.06	12.61		LSD/ 9.60	DA/10.59	AC/13.16	HGO/13.76	WL/18.29
WSCC-3	70%	11.40	12.33		LSD/ 9.04	DA/10.06	AC/12.62	HGO/13.03	WL/18.17
WSCC-4	70%	10.97	11.63		LSD/ 8.81	DA/ 9.69	AC/12.13	HGO/12.50	WL/17.99
LOW SULFUR COAL									
ECAR	70%	10.91	11.24		LSD/ 8.69	DA/ 9.65	AC/12.18	HGO/12.43	WL/17.18
ERCOT	70%	13.04	13.58		LSD/10.49	DA/11.43	AC/14.16	HGO/14.54	WL/19.91
MAAC	70%	10.29	10.70		LSD/ 8.17	DA/ 9.12	AC/11.67	HGO/11.87	WL/16.81
MAIN	70%	10.95	11.42		LSD/ 8.65	DA/ 9.66	AC/12.43	HGO/12.86	WL/17.24
MARCA-1	70%	12.60	13.32		LSD/10.06	DA/11.03	AC/13.73	HGO/14.24	WL/19.25
MARCA-2	70%	11.86	12.49		LSD/ 9.45	DA/10.44	AC/13.05	HGO/13.44	WL/18.18
NPCC	70%	10.64	10.95		LSD/ 8.51	DA/ 9.44	AC/11.78	HGO/11.97	WL/16.96
SERC	70%	11.07	11.18		LSD/ 8.84	DA/ 9.80	AC/12.21	HGO/12.31	WL/17.47
SPP-1	70%	12.20	12.65		LSD/ 9.78	DA/10.67	AC/13.21	HGO/13.57	WL/18.73
SPP-2	70%	11.42	11.71		LSD/ 9.08	DA/10.08	AC/12.43	HGO/12.58	WL/17.74
WSCC-1	70%	12.22	12.91		LSD/ 9.85	DA/10.76	AC/13.07	HGO/13.65	WL/18.21
WSCC-2	70%	11.21	11.75		LSD/ 8.88	DA/ 9.65	AC/12.00	HGO/12.40	WL/17.00
WSCC-3	70%	10.47	11.18		LSD/ 8.26	DA/ 9.01	AC/11.28	HGO/11.56	WL/16.64
WSCC-4	70%	10.18	10.77		LSD/ 8.14	DA/ 8.81	AC/11.02	HGO/11.31	WL/16.75

*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN DEMONSTRATED FOR LSD SYSTEM

LEGEND: DA - DUAL ALKALI HGO - MAGNESIA SLURRY WL - WELLMAN LORD.
AC - AQUEOUS CARBONATE LSD - LIME SPRAY DRYER

APPENDIX I
FGD ECONOMIC COST MODEL

APPENDIX I

FGD ECONOMIC COST MODEL

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APPENDIX I

FGD ECONOMIC COST MODEL

The programs, as well as sample input data and sample JCL files are available on 1/2-inch tape.

Table I-1. FILES CONTAINING THE FGD COST PROGRAM

<u>File Name</u>	<u>Description</u>
TEST7	Main PL/I program
TABLE4	Summary tabulation program
(TRIM)	Contained in JCL file. PL/I* program which trims the input file
FGDAT01	Input to TRIM.
(GO.FLCC)	Contained in JCL file. Control strings for input to TEST7.
TESTJCL7	Sample JCL.

APPENDIX I

1. BRIEF DESCRIPTION OF SYSTEM

The FGD cost model is a computer program which estimates the cost of seven different electric utility FGD systems. Total cost is broken down into component or detailed costs, and cost equations are developed for each detailed cost item. The total cost is then computed by summing all the detailed costs. Subsystem or component costs are generally approximated by a power-law relationship, while O&M cost items are approximated using well established relationships, usually linear in the quantities involved (see Section 4 in main text for a discussion of the cost equations). All cost equations are in directly readable form in the program. The major variables which are changeable by the user are the plant size, regional coal data (e.g., sulfur content, heating value), regional material costs (e.g., cost of water or electricity), and the power-law coefficients.

The main and tabulation programs are written in PL/I, mainly for an IBM/370 computer, but can be run on any other computer system supporting PL/I with only minor modifications. Two input datasets are required, and the output is routed to three print datasets as well as one on-line dataset, which can be saved for further analysis.

APPENDIX I

2. DESCRIPTION OF COMPUTATIONS AND STRUCTURE OF PROGRAM

Structurally, the main program can be described as follows:

- 1) STORAGE ASSIGNMENT SECTION -- Declare arrays and assign constant values.
- 2) DATA INPUT SECTION -- Larger arrays are read in and stored.
- 3) COMPUTATION SECTION -- Capital and O&M costs are computed.
- 4) SUBROUTINES SECTION -- Ten subroutines are included. The first one computes various system parameters which will be used in the cost equations. The next seven perform system-specific cost computations for the seven FGD systems under consideration. The last two summarize the computation results.

Other than conditionally activated dumping statements which display key variables at strategic locations, very little branching is included in the program. The whole program can be thought of as a linear structure, where one computation simply follows another.

FGD installation costs are computed by accounting for the cost of an individual component or subsystem. For example, the direct capital cost would include the cost of twelve subsystems, including the materials handling subsystem, the gas handling subsystem, the SO_2 absorption subsystem, the stack gas reheat subsystem, and so on. Most of these component costs are given in a power-law form: $\text{Cost} = A \cdot B^{**} C$, where A and C are input coefficients and powers, and B is either G (the gas flow rate), or S (the sulfur dioxide removal rate). Similarly, the O&M costs are calculated by summing the various cost components, such as utilities' cost, labor cost and raw materials' cost. However, cost equations for O&M costs are usually different from system to system.

After the total capital cost and total O&M costs are calculated, a levelized capital cost and a levelized O&M cost is computed. Please refer to the section on levelization (Section 4 in main text) for an explanation.

After calculating the various costs and levelized costs, the results are tabulated in two tables: 1) a table of total capital costs of all seven systems, including the component costs, and 2) a table of annual operating cost and levelized costs. One set of two tables is produced for each region, each plant size, each sulfur content, and for new and retrofit plants. Each run will therefore produce:

14 (regions) x 2 plant sizes x 2 sulfur contents
x 2 (new or retrofit) x 2 (tables per set)

= 112 tables (see Appendix G)

In addition to the 112 summary tables, the following items are stored into another output file: capital cost per KW, levelized capital cost and levelized operating cost, and levelized total cost. This separate output file can be listed or tabulated for a concise summary of all systems, all regions, all plant sizes, and all sulfur content. A total of eight tables can be compiled from this output data file which can fit onto a standard computer output page (132 columns x 66 rows) (see pp. 5-4 to 5-11 of main text).

The last PL/I program, TABLE4, summarizes the data even further. Only the levelized total is inspected, and this total is sorted for the advanced systems: lime spray dryer, dual alkali, aqueous carbonate, magnesia slurry and Wellman-Lord. These systems and the levelized total is tabulated in order of increasing cost, adjacent to lime and limestone levelized totals. Four tables are produced per run; these tables show how the advanced systems compare with each other and with the established systems in terms of the levelized total cost (see pp. 5-21 to 5-24 of the main text).

APPENDIX I

3. INPUT DESCRIPTION AND INPUT FILE FORMAT

The FGD program accepts input data through two PL/I data files: STEP1. GO.SYSIN and STEP2. GO.FLCC. The GO.SYSIN file is rather free-format and contains most of the relevant input data. The GO.FLCC file contains control arrays and is in a fixed format. In addition, some data items are compiled into the program but can also be changed if necessary (Table I.3-1).

The GO.SYSIN data file is the major input file. It contains regional coal data (PSC, CASH, and CHHV), regional raw material costs, and power-law coefficients and powers. An example of the data file can be found in FGDATA01. All lines beginning with '*' are comments and will be ignored. Data items are entered into the remaining lines as fixed point constants, starting in column 11. All data lines except the last contain seven items each. No column counting is necessary. Each item is separated from the next by a blank column. A more concise description can be found in Table I.3-1 at the end of this section.

The GO.FLCC file is a fixed-format file. The first three lines are reserved for comments. The following lines contain various control strings. All FLCC data fields start at column 11. The first ten columns are reserved for naming the data field. For a detailed description, see Table I.3-2. The control number CVAR is used with multiplier MULT to perform sensitivity analyses on various regional material costs and also on several capital cost components. For a more detailed description of these control variables, see Section 4 of this Appendix.

Table I.3-1. MODEL VARIABLE IDENTIFICATION

Data Line #	FGDAT01 Line #	File Array Name	Description (7 items per line, unless otherwise stated)
1	9	PSC	% sulfur, high sulfur coal, Regions 1-7
2	10	PSC	% sulfur, high sulfur coal, Regions 8-14
3	11	PSC	% sulfur, low sulfur coal, Regions 1-7
4	12	PSC	% sulfur, low sulfur coal, Regions 8-14
5	13	CASH	% ash, high sulfur coal, Regions 1-7
6	14	CASH	% ash, high sulfur coal, Regions 8-14
7	15	CASH	% ash, low sulfur coal, Regions 1-7
8	16	CASH	% ash, low sulfur coal, Regions 8-14
9	17	CHHV	Heating value, high sulfur coal, Regions 1-7
10	18	CHHV	Heating value, high sulfur coal, Regions 8-14
11	19	CHHV	Heating value, low sulfur coal, Regions 1-7
12	20	CHHV	Heating value, low sulfur coal, Regions 8-14
13	26	LNDC	Land cost, Regions 1-7
14	27	LNDC	Land cost, Regions 8-14
15	28	LMCO	Lime cost, Regions 1-7
16	29	LMCO	Lime cost, Regions 8-14
17	30	ELCO	Electricity cost, Regions 1-7
18	31	ELCO	Electricity cost, Regions 8-14
19	32	WTRC	Water cost, Regions 1-7
20	33	WTRC	Water cost, Regions 8-14
21	34	LBCO	Labor cost, Regions 1-7
22	35	LBCO	Labor cost, Regions 8-14
23	36	LSCO	Limestone cost, Regions 1-7
24	37	LSCO	Limestone cost, Regions 8-14
25	38	SACO	Soda ash cost, Regions 1-7
26	39	SACO	Soda ash cost, Regions 8-14
27	40	FOLC	Fuel oil cost, Regions 1-7
28	41	FOLC	Fuel oil cost, Regions 8-14
29	42	GASC	Gas cost, Regions 1-7
30	43	GASC	Gas cost, Regions 8-14
31	44	COLC	Coal cost, Regions 1-7
32	45	COLC	Coal cost, Regions 8-14
33	46	MGCO	MgO cost, Regions 1-7
34	47	MGCO	MgO cost, Regions 8-14
35	48	STMC	Steam cost, Regions 1-7
36	49	STMC	Steam cost, Regions 8-14
37	57	EH	Multiplier for materials handling subsystem, new plants
38	58	EH	Multiplier for feed preparation subsystem, new plants
39	59	EH	Multiplier for gas handling subsystem, new plants
40	60	EH	Multiplier for purge subsystem, new plants
41	61	EH	Multiplier for SO ₂ absorption subsystem, new plants
42	62	EH	Multiplier for stack gas reheat subsystem, new plants

Table I.3-1. MODEL VARIABLE IDENTIFICATION (Cont'd)

Data Line #	FGDAT01 File Line #	Array Name	Description (7 items per line, unless otherwise stated)
43	63	EH	Multiplier for regeneration subsystem, new plants
44	64	EH	Multiplier for sludge disposal subsystem, new plants
45	65	EH	Multiplier for acid production subsystem, new plants
46	66	EH	Multiplier for sulfur production subsystem, new plants
47	67	EH	Multiplier for ESP credit, new plants
48	68	EH	Multiplier for sludge pond, new plants
49	72	EH	Enter seven zeros
50	73	EH	
51	74	EH	
52	75	EH	
53	76	EH	
54	77	EH	
55	78	EH	
56	79	EH	
57	80	EH	
58	81	EH	
59	82	EH	
60	83	EH	
61	87	EH	Power law index for material handling subsystem
62	88	EH	Power law index for feed preparation subsystem
63	89	EH	Power law index for gas handling subsystem
64	90	EH	Power law index for purge subsystem
65	91	EH	Power law index for SO ₂ absorption subsystem
66	92	EH	Power law index for stack gas reheat subsystem
67	93	EH	Power law index for regeneration subsystem
68	94	EH	Power law index for sludge disposal subsystem
69	95	EH	Power law index for acid production subsystem
70	96	EH	Power law index for sulfur production subsystem
71	97	EH	Power law index for ESP credit
72	98	EH	Power law index for sludge pond
73	102	CEF	Sludge pond cost adjustment coefficients. Seven FGD systems
74	103	ALIGN2	Enter: 71059382

Table I.3-2. DETAILED DESCRIPTION OF NAMING DATA FIELD INPUT FORMAT

<u>Line #</u>	<u>Description</u>	<u>Description</u>
1-3	ANY COMMENTS	
4	RUNNAME	COL(11), A(20)
5	SWITCH	COL(11), (20)F(1) Control away
6	ENABLE	COL(11), (7)F(1) Enter seven 1's
7	MULT	COL(11), F(3,1)
8	CVAR	COL(11), F(2)
9	ALIGN1	COL(11), F(10) Enter 13579

Table I.3-3. ADDITIONAL INPUT DATA COMPILED WITHIN MODEL

Program Listing Line #	Variable Name	Description (all numbers are floating point unless otherwise stated)
36	DEE	12 numbers, one for each subsystem. Multiplier to convert power-law coefficient from new to retrofit systems.
39	XBRLY	2 numbers, for new and retrofit. Remaining life in boilers.
41	XTMCTE	2 numbers, for new and retrofit. Transportation mileage.
43	XCFPE	4 numbers: (NEW, 500 MW), (NEW, 100 MW), (RETROFIT, 500 MW), (RETROFIT, 100 MW) plant efficiency.
45	XMW	2 numbers: Plant size in megawatts.
47	XN	4 integers for the following combinations (in this order): (NEW, 500 MW), (NEW, 100 MW), (RETROFIT, 500 MW), (RETROFIT, 100 MW)
105	CATC	Catalyst lost per pound. One number.
107	SULC	Sulfur cost or price, per ton. One number.
109	ACDC	Acid cost, dollars per ton. One number.
112	K3	Conversion factor (cost index)
123	THG	Flue gas temperature, degrees Fahrenheit.
125	XSF	Percent excess air.
129	WPX	Weight percent of coal combustion products.
135	FC	Levelizing factor for capital costs.
137	LF	Levelizing factor for operating costs.
200	CF	Operating capacity factor.
	DSTF	Fraction of sulfur in coal contained in combustion product gas.
	CATF	Fraction of ash in coal entrained in combustion product gas.
356	WPCL	Weight percent of chloride in coal.

APPENDIX I

4. CONTROL VARIABLES AND SENSITIVITY ANALYSIS

In a normal run of the program, only the two summary tables are produced for other purposes, it may be useful to know the intermediate values of some variables. The input away SWITCH can be used to dump intermediate values. Only the first six elements are significant. The remaining are reserved for future use. In a normal run, elements 4 and 5 are "1" to print the two summary tables, and all other elements are "0" (zero) to suppress dumping of intermediate data. The switches can be set to any combination of 1's and 0's to suppress the summary tables or to dump intermediate values. All data dumped will be in a separate output datafile so that the summary tables will not be interrupted (see Table I.4-1 for specific function of switches).

There are also two more input variables, MULT and CVAR, in input dataset FLCC. Normally, CVAR is zero. For a sensitivity run, CVAR is set to a number between 1 and 8 to achieve the desired sensitivity analysis (see Table I.4-2). When CVAR is set to between 1 and 8, a raw material cost (determined by the value of CVAR) or a capital cost component will be multiplied by MULT. By selecting CVAR and MULT properly, the effect of any percentage change in the cost of a single raw material item on the total and levelized costs can be computed. Notice that only one item (raw material or capital cost item) can be varied at a time.

Table I.4-1. IDENTIFICATION OF SPECIFIC SWITCH FUNCTIONS

<u>SWITCH Number</u>	<u>Normal Value</u>	<u>Action Taken if Set to Complement of Normal Value</u>
1	0	Dump loop indices and computed parameters such as G, S (gas flow rate and sulfur removal rate).
2	0	Dump computer power law coefficients for retrofit systems.
3	0	Dump regional, raw material, utilities, and labor costs for a single region.
4	1	Suppress printing of first summary table (total capital costs and component costs).
5	1	Suppress printing of second summary table (O&M costs and levelized costs).
6	0	Dump all regional, raw material, utilities, and labor costs, as well as CVAR and MULT.

Table I.4-2. EFFECT OF CVAR AND MULT

<u>CVAR</u>	<u>Effect</u>
0	Normal run. All material costs are actual values.
1	Lime cost is multiplied by MULT.
2	Limestone cost is multiplied by MULT.
3	Soda ash cost is multiplied by MULT.
4	Magnesium cost is multiplied by MULT.
5	Fuel oil cost is multiplied by MULT.
6	Natural gas cost is multiplied by MULT.
7	Sulfur cost is multiplied by MULT.
8	Sulfuric acid cost is multiplied by MULT.
9	SO ₂ absorption subsystem cost is multiplied by MULT.
10	Regeneration subsystem cost is multiplied by MULT.
11	Acid production facility cost is multiplied by MULT.
12	Sulfur production cost is multiplied by MULT.

APPENDIX I

5. HOW TO RUN THE MODEL

To use the model, a tape containing the files must be obtained. The files are then transferred to on-line data files on the user's computer system, preferably an IBM/370 which has PL/I capability. The JCL file then must be examined and converted to comply with all system JOB card and dataset naming restrictions. An input data file is then prepared, using the sample data file FGDATA01 and the input description (Section I-3) as a guide. The job can then be submitted and the output examined after it has been run. An easy way to ensure input data file accuracy is to base all datafiles on FGDATA01 and edit to get the correct values. Some constants can only be changed inside the program itself. These are listed in Table I.3-3.

In writing the job card, allow a REGION of 250K and a TIME of 20 seconds.

6. COMPUTER PRINTOUT MATERIAL

6.1 MAIN PROGRAM

```

? USE FROM POW.TEST7 ON CAT CLR:|
1.      /* TEST PROGRAM---TABLE                                     */
2.      TEST:  PROCEDURE OPTIONS(MAIN) ;
3.      DECLARE
4.      (MATHAND(7),GASHAND(7),PURGE(7),SO2ARS(7),SGRH(7),REGEN(7),
5.      SLUDGE(7),ACIDPS(7),SULPS(7),ESPCRED(7),MISC(7),SPOND(7),
6.      SUBTOT(7),SUBTOT2(7),DIRCCAP(7))
7.      DEC FLOAT, /* DIRECT INVEST. CATEGORIES */
8.      (ARCHEXP(7),CONSEXP(7),CONTFEE(7),CONTING(7),SHKDOWN(7),
9.      INTRST(7),LAND(7),WORKCAP(7),TOTCAP(7))
10.     DEC FLOAT, /* INDIRECT INVESTMENT CATGRS */
11.     (LIME(7),LIMSTN(7),SODASH(7),MAGOX(7),COAL(7),
12.     CTLYST(7),ELECT(7),WATER(7),REHEAT(7),FUOIL(7),NATGAS(7),
13.     CREDIT(7),TOTVAR(7),WSTDSP(7),LABOR(7),MAINT(7),TOTFIX(7),
14.     PLNTOH(7),ADMINOH(7),MRKTOH(7),ACID(7),SULFUR(7),NETOMC(7),
15.     LEVCAP(7),LEVOP(7),TOTLEV(7))
16.     DEC FLOAT, /* :INew,IT,IT                                     */
17.     (QLIME(7),QLIMSTN(7),QSODASH(7),QMAGOX(7),QCOAL(7),QCTLYST(7),
18.     QREHEAT(7),QFUOIL(7),QNATGAS(7),QCREDIT(7),QWSTDSP(7),
19.     QMRKTOH(7),QACID(7),QSULFUR(7))
20.     CHAR(13) /* PRINTING ARRAYS                                     */
21.     INIT((7)(1)' --- '),
22.     (QPURGE(7),QREGEN(7),QSLUDGE(7),QACIDPS(7),QSULPS(7),QESPCRD(7),
23.     QSPOND(7),QSGRH(7)) CHAR(13) /* CAP COST PRINTING ARRAYS */
24.     INIT((7)(1)' --- '),
25.     (XPSC(2,14),XCASH(2,14),XCHHV(2,14))
26.     DEC FLOAT, /* ICOAL,IREG                                     */
27.     (XLNDC(14),XLHCO(14),XELCO(14),XWTRC(14),
28.     XLBCO(14),XLSCO(14),XSACO(14),XFOLC(14),XGASC(14),
29.     XCOLC(14),XMGC(14),XSTHC(14))
30.     DEC FLOAT, /* INPUT ARRAYS :IREG */
31.     EH(2,12,7) DEC FLOAT, /* :INew,IV,IT */
32.     /* POWER EQTN CONSTANTS */
33.     B(12,7) DEC FLOAT, /* :IV,IT POWERS */
34.     CEE(7) DEC FLOAT, /* :IT ADJUSTMENT COEFFS */
35.     /* FOR SLUDGE POND */
36.     DEE(12) DEC FLOAT /* :IVAR ADJUSTMENT */
37.     INIT( /* FACTORS FOR RETROFIT */
38.     1.11,1.07,1.15,1.0,1.05,1.0,1.05,1.10,1.01,1.01,1.0,1.0),
39.     XBRLY(2) DEC FLOAT /* :INew REMAINING LIFE */
40.     INIT(30.,20.), /* IN BOILERS */
41.     XTHGE(2) DEC FLOAT /* : INew */
42.     INIT(1.0,50.0), /* TRANSPORTATION MILEAGE */
43.     XCFPE(2,2) DEC FLOAT /* :INew,IMW */
44.     INIT(9760.,10350.,10050.,10675.), /* PLANT EFFICIENCY */
45.     XMW(2) DEC FLOAT /* :IMW */
46.     INIT(500.,100.),
47.     XN(2,2) FIXED DEC(1) /* :INew,IMW # OF UNITS */
48.     INIT(4,2,3,2),
49.     TITLE1(27) CHAR(36) /* NAME OF CAPITAL COST */
50.     INIT( /* CATEGORIES */

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51. 'MATERIALS HANDLING/PREPARATION','GAS HANDLING',
52. 'CHLORIDE PURGE','SO2 ABSORPTION','STACK GAS REHEAT',
53. 'REGENERATION','SLUDGE DISPOSAL',
54. 'SULFURIC ACID PRODUCTION/STORAGE','SULFUR PRODUCTION/STORAGE',
55. 'ESP CREDIT','SERVICES,UTILITIES,MISC','SLUDGE POND',
56. 'TOTAL DIRECT INVESTMENT','ARCHITECT & ENGINEERING DESIGN',
57. 'SUPV. & CONTRACTOR EXPENSES','CONSTRUCTION EXPENSE',
58. 'CONTRACTOR FEES','CONTINGENCY','ALLOWANCE FOR SHAKEDOWN',
59. 'INTEREST DURING CONSTRUCTION',
60. 'LAND','WORKING CAPITAL','TOTAL CAPITAL INVESTMENT',
61. TITLE2(26) CHAR(36) /* NAMES FOR O&M COSTS */
62. INIT(
63. 'LIME','LIMESTONE','SODA ASH','MAGNESIUM OXIDE','COAL',
64. 'CATALYST','ELECTRICITY','WATER','STEAM','FUEL OIL',
65. 'NATURAL GAS','HEAT CREDIT','TOTAL VARIABLE O&M COST',
66. 'WASTE DISPOSAL(TRUCKING)','OPERATING,ANALYSIS,SUPERVISION',
67. 'LABOR & MATERIAL','TOTAL FIXED O&M COST','PLANT',
68. 'ADMINISTRATIVE','MARKETING','SULFURIC ACID',
69. 'SULFUR','NET OPERATING COST','LEVELIZED CAPITAL COST(MILL/KWH)',
70. 'LEVELIZED OPERATING COST(MILL/KWH)',
71. 'TOTAL LEVELIZED COST(MILL/KWH)',
72. REGNAME(14) CHAR(8) /* NAME OF REGIONS */
73. INIT('ECAR','ERCOT','HAAC','HAIN','MARCA-1','MARCA-2',
74. 'NPCC','SERC','SPP-1','SPP-2','WSCC-1','WSCC-2',
75. 'WSCC-3','WSCC-4'),
76. NAME2(7,2) CHAR(11) /* FGD TYPE NAMES */
77. INIT(
78. 'LIME','LIMESTONE','DUAL','ALKALI','MAGNESIA',
79. 'SLURRY','WELLMAN','LORD','AQUEOUS','CARBONATE',
80. 'LIME SPRAY','DRYER'),
81. BL CHAR(132) /* BLANK LINE */
82. INIT((132) ' '),
83. TITLEA CHAR(60) /* TITLE */
84. INIT('TOTAL COST FOR FGD SYSTEMS, IN THOUSAND 1980 DOLLARS'),
85. TITL2B CHAR(60) /* TITLE, SECOND PAGE */
86. INIT('ANNUAL REVENUE REQUIREMENTS, IN THOUSAND 1980 DOLLARS'),
87. RUNNAME CHAR(20) /* RUNNAME */
88. INIT('RUN001:03/15/81'),
89. SWITCH(20) FIXED DEC(1)/* LOGIC SWITCHES */
90. INIT((20)1),
91. ENABLE(7) FIXED DEC /* PARTICLE REMOVAL ENABLER */
92. INIT((6)0,1),
93. CVAR FIXED DEC, /* SENSITIVITY RUN SWITCH */
94. MULT DEC FLOAT, /* SENSITIVITY MULTIPLIER */
95. APPLTN(2) CHAR(8) /* NEW OR RETROFIT */
96. INIT('NEW','RETROFIT'),
97. (ITABLE,ITAB) FIXED DEC /* TABLE COUNTERS */
98. INIT(0),
99. (IX,I,J,ICOAL,IREF,ISIZE,IT,INEW,IMW)
100. FIXED DEC(3), /* MISC. INDICES */
101. (CFR,MW,CFPE,CHHV,SO2S1,SO2S2,PSC,CSTF,R,S,SO,ATP1,ATP2,CASH,
102. CATF) DEC FLOAT, /* NEEDED BY SUBRTN CONSTANT */
103. (N,CF,BRLY,LHDC,LHCO,WTRC,STHC,LBCO,THGE,G,
104. HOS03,LSCO,SACO) DEC FLOAT, /* OTHER INPUT VARIABLES */

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105.      CATC          DEC FLOAT  /* CATALYST COST          */
106.      INIT(2.5),
107.      SULC          DEC FLOAT  /* SULFUR COST          */
108.      INIT(80.),
109.      ACDC          DEC FLOAT  /* ACID COST            */
110.      INIT(35.),
111.      (K1,K2,K4)     DEC FLOAT, /* MISC. FACTORS        */
112.      K3             DEC FLOAT  /* CONVERSION FACTOR    */
113.      INIT(1.1),
114.      M(10)          DEC FLOAT  /* REACTANT MOLECULAR WEIGHTS */
115.      INIT(44.01,36.46,64.06,32.,28.02,18.016,12.01,33.45,
116.      32.06,1.008),
117.      N2AIR          DEC FLOAT  /* PERCENTAGE OF NITROGEN */
118.      INIT(76.85),
119.      O2AIR          DEC FLOAT  /* PERCENTAGE OF OXYGEN   */
120.      INIT(23.15),
121.      H2OAIR         DEC FLOAT  /* PERCENTAGE OF WATER IN AIR */
122.      INIT(1.3),
123.      THG            DEC FLOAT  /* FLUE GAS TEMPERATURE  */
124.      INIT(300.),
125.      XSF            DEC FLOAT  /* EXCESS AIR            */
126.      INIT(0.39),
127.      (LEFT,K6)      DEC FLOAT, /* NEEDED FOR G COMPUTATION */
128.      WPX(3,5)       DEC FLOAT  /* WP ARRAY              */
129.      INIT(41.4,3.0,12.0,0.7,10.6,
130.      70.8,4.4,6.1,1.4,9.3,
131.      57.3,4.0,9.3,1.1,11.3),
132.      WPACT(5)       DEC FLOAT  /* ACTUAL WP ARRAY       */
133.      INIT((5)0.0),
134.      F(6)           DEC FLOAT, /* ARRAY FOR G CALCULATION */
135.      FC(2)          DEC FLOAT  /* :INEW LEV COST FACTOR 1 */
136.      INIT(.18,.19),
137.      LF(2)          DEC FLOAT  /* :INEW LEV COST FACTOR 2 */
138.      INIT(1.886, 1.629),
139.      (ALIGN1,ALIGN2) FIXED DEC(10) /* ALIGNMENT BITS        */
140.      INIT(123456)),
141. /* LOAD DATA ARRAYS, PREPARE OUTFIT FILES          */
142. OPEN FILE(SYSPRINT) LINESIZE(132),
143. FILE(SYSOUT) PRINT LINESIZE(132),
144. FILE(OUTPUT) OUTPUT STREAM LINESIZE(80),
145. FILE(SYSIN) INPUT STREAM,
146. FILE(FLCC) INPUT STREAM;
147. GET FILE(FLCC) EDIT(RUNNAME,SWITCH,ENABLE,MULT,CVAR,ALIGN1)
148. (SKIP(3),COL(11),A(20),SKIP,COL(11),(20)F(1),
149. SKIP,COL(11),(7)F(1),SKIP,COL(11),F(3,1),SKIP,COL(11),F(2),
150. SKIP,COL(11),F(10));
151. IF ALIGN1 NE 13579 THEN PUT EDIT('?(PT001) FLCC LINES ',
152. 'OUT OF ALIGNMENT.')(SKIP,A,A);
153. GET FILE(SYSIN) LIST(XPSC,XCASH,XCHHV,XLNDC,XLNCO,XELCO,
154. XWTRC,XLBCC,XLSCC,XSACC,XFOLC,XGASC,XCOLC,XMGCC,
155. XSTMC,EH,R,CFF,ALIGN2);
156. IF ALIGN2 NE 71059382 THEN PUT EDIT('?(PT000) SYSIN LINES ',
157. 'OUT OF ALIGNMENT.')(SKIP,A,A);
158. PUT FILE(OUTPUT) EDIT (RUNNAME)(SKIP,A);

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159.      /* SENSITIVITY ANALYSIS: CHANGE REGIONAL COSTS                                */
160.      IF CVAR = 1 THEN XLHCO = XLHCO * MULT;
161.      IF CVAR = 2 THEN XLSCO = XLSCO * MULT;
162.      IF CVAR = 3 THEN XSACO = XSACO * MULT;
163.      IF CVAR = 4 THEN XHGCC = XHGCC * MULT;
164.      IF CVAR = 5 THEN XFOLC = XFOLC * MULT;
165.      IF CVAR = 6 THEN XGASC = XGASC * MULT;
166.      IF CVAR = 7 THEN SULC = SULC * MULT;
167.      IF CVAR = 8 THEN ACDC = ACDC * MULT;
168.      IF CVAR = 9 THEN EH(*,5,*) = EH(*,5,*) * MULT;
169.      IF CVAR = 10 THEN EH(*,7,*) = EH(*,7,*) * MULT;
170.      IF CVAR = 11 THEN EH(*,9,*) = EH(*,9,*) * MULT;
171.      IF CVAR = 12 THEN EH(*,10,*) = EH(*,10,*) * MULT;
172.      IF SWITCH(6) = 1 THEN DO;
173.      PUT FILE(SYSOUT) EDIT ('**REGIONAL COSTS:')(SKIP,A);
174.      PUT FILE(SYSOUT) EDIT ('LNDC:',XLNDC)(R(FORMC));
175.      PUT FILE(SYSOUT) EDIT ('LHCO:',XLHCO)(R(FORMC));
176.      PUT FILE(SYSOUT) EDIT ('ELCO:',XELCO)(R(FORMC));
177.      PUT FILE(SYSOUT) EDIT ('WTRC:',XWTRC)(R(FORMC));
178.      PUT FILE(SYSOUT) EDIT ('LBCO:',XLBCO)(R(FORMC));
179.      PUT FILE(SYSOUT) EDIT ('LSCO:',XLSCO)(R(FORMC));
180.      PUT FILE(SYSOUT) EDIT ('SACO:',XSACO)(R(FORMC));
181.      PUT FILE(SYSOUT) EDIT ('FOLC:',XFOLC)(R(FORMC));
182.      PUT FILE(SYSOUT) EDIT ('GASC:',XGASC)(R(FORMC));
183.      PUT FILE(SYSOUT) EDIT ('COLC:',XCOLC)(R(FORMC));
184.      PUT FILE(SYSOUT) EDIT ('HGCO:',XHGCC)(R(FORMC));
185.      PUT FILE(SYSOUT) EDIT ('STHC:',XSTHC)(R(FORMC));
186.      PUT FILE(SYSOUT) EDIT ('CATC:',CATC)(R(FORMD));
187.      PUT FILE(SYSOUT) EDIT ('SULC:',SULC)(R(FORMD));
188.      PUT FILE(SYSOUT) EDIT ('ACDC:',ACDC)(R(FORMD));
189.      PUT FILE(SYSOUT) EDIT ('CVAR:',CVAR)(R(FORMD));
190.      PUT FILE(SYSOUT) EDIT ('MULT:',MULT)(R(FORMD));
191.      FORMC: FORMAT(SKIP,A,COL(10),(14)F(8,2));
192.      FORMD: FORMAT(SKIP,A,COL(10),F(8,2));
193.      END;
194.      /* GET COEFFICIENTS FOR RETROFIT SYSTEMS                                    */
195.      PT01: DO IT = 1 TO 7; EH(2,*,IT) = EH(1,*,IT) * DEE(*); END PT01;
196.      IF SWITCH(2) = 1 THEN PUT FILE(SYSOUT) EDIT('**EH:',EH
197.      (SKIP,A,(48)(SKIP,(7)(F(12,3),X(1)))));
198.      /* COMPLETED COMPUTATION OF RETROFIT SYSTEM COEFFICIENTS                    */
199.      /* ASSIGN SOME CONSTANTS                                                        */
200.      CF = 0.8; CSTF = 0.95; CATF = 0.8;
201.      PT02: DO INEW = 1 TO 2; /* NEW 3 RETROFIT */
202.      BRLY = XBRLY(INEW);THGE = XTHGE(INEW);
203.      DO IREG = 1 TO 14; /* 14 REGIONS */
204.      LNDC = XLNDC(IREG);LHCO = XLHCO(IREG);
205.      ELCO = XELCO(IREG);WTRC = XWTRC(IREG);LBCO = XLBCO(IREG);
206.      LSCO = XLSCO(IREG);SACO = XSACO(IREG);
207.      FOLC = XFOLC(IREG);GASC = XGASC(IREG);COLC = XCOLC(IREG);
208.      HGCO = XHGCC(IREG);STHC = XSTHC(IREG);ALSCO = 2. * LHCO;
209.      DO IMW = 1 TO 2; /* TWO PLANT SIZES */
210.      MW = XMW(IMW);N = XN(INEW,IMW);CFPE = XCFPE(INEW,IMW);
211.      DO ICOAL = 1 TO 2; /* HI 3 LO SULFUR */
212.      PSC = XPSC(ICOAL,IREG);CASH = XCASH(ICOAL,IREG);
213.      CHHV = XCHHV(ICOAL,IREG);
214.      K1 = (1. + 1./N);
215.      /* FILL IN ARRAYS WITH DUMMY DATA */
216.      CALL CONST;
217.      IF SWITCH(1) = 1 THEN PUT FILE(SYSOUT) EDIT
218.      ('**DUMP',ICOAL,IMW,INEW,IREG,N,G,S,CF,PSC,CFR,A,R,ATP1,ATP2,
219.      S02S1,S02S2)(SKIP,A,(5)F(3),SKIP,(11)(F(10,2),X(1)));
220.      IF SWITCH(3) = 1 THEN DO;
221.      PUT FILE(SYSOUT) EDIT('** LHCO,LSCO,SACO,HGCC,COLC,CATC,ELCO',
222.      LHCO,LSCO,SACO,HGCC,COLC,CATC,ELCO)(SKIP,A,SKIP,(7)F(9,2));
223.      PUT FILE(SYSOUT) EDIT('**WTRC,STHC,LBCO,BRLY,LNDC,GASC,SULC',
224.      WTRC,STHC,LBCO,BRLY,LNDC,GASC,SULC)(SKIP,A,SKIP,(7)F(9,2));
225.      PUT FILE(SYSOUT) EDIT('**FOLC,ACDC,THGE',FOLC,ACDC,THGE
226.      (SKIP,A,SKIP,(3)F(9,2)));
227.      END;

```



```

228. /* COMPUTE CAPITAL COSTS USING POWER LAW APPROXIMATIONS */
229. MATHAND = K3 * EH(INEW,1,X) * S ** B(1,X) +
230.          K3 * EH(INEW,2,X) * S ** B(2,X);
231. GASHAND = K3 * EH(INEW,3,X) * G ** B(3,X) * K1;
232. PURGE = K3 * EH(INEW,4,X) * G ** B(4,X);
233. SO2ABS = K3 * EH(INEW,5,X) * G ** B(5,X) * K1;
234. SGRH = K3 * EH(INEW,6,X) * G ** B(6,X) * K1;
235. REGEN = K3 * EH(INEW,7,X) * S ** B(7,X);
236. SLUDGE = K3 * EH(INEW,8,X) * S ** B(8,X);
237. ACIDPS(4) = K3 * EH(INEW,9,4) * S ** B(9,4);
238. SULPS(5) = K3 * EH(INEW,10,5) * S ** B(10,5);
239. SULPS(6) = K3 * EH(INEW,10,6) * S ** B(10,6);
240. ESPCRD(7) = K3 * EH(INEW,11,7) * G ** B(11,7);
241. SPOND = K3 * EH(INEW,12,X) * S ** B(12,X);
242. /* LOAD DATA INTO PRINTING ARRAYS, TAKE CARE OF SPECIAL CASES */
243. PT020: DO IT = 4,5;
244.          PUT STRING (QPURGE(IT)) EDIT (PURGE(IT))(X(3),F(7,0,-3));
245.          END PT020;
246. PT021: DO IT = 3 TO 6;
247.          PUT STRING (QREGEN(IT)) EDIT (REGEN(IT))(X(3),F(7,0,-3));
248.          END PT021;
249. PT022: DO IT = 1 TO 3,7;
250.          PUT STRING (QSLUDGE(IT)) EDIT (SLUDGE(IT))(X(3),F(7,0,-3));
251.          END PT022;
252.          PUT STRING (QACIDPS(4)) EDIT (ACIDPS(4))(X(3),F(7,0,-3));
253.          PUT STRING (QSULPS(5)) EDIT (SULPS(5))(X(3),F(7,0,-3));
254.          PUT STRING (QSULPS(6)) EDIT (SULPS(6))(X(3),F(7,0,-3));
255.          PUT STRING (QESPCRD(7)) EDIT ((' ',ESPCRD(7),' '))
256.          (X(2),A,F(7,0,-3),A);
257. PT023: DO IT = 1 TO 3;
258.          SPOND(IT) = SPOND(IT) - CEE(IT) * K3 * S;
259.          PUT STRING (QSPOND(IT)) EDIT (SPOND(IT))(X(3),F(7,0,-3));
260.          END PT023;
261. PT024: DO IT = 5,7;
262.          SPOND(IT) = SPOND(IT) + CEE(IT) * K3 * G;
263.          PUT STRING (QSPOND(IT)) EDIT (SPOND(IT))(X(3),F(7,0,-3));
264.          END PT024;
265. PT025: DO IT = 1 TO 5;
266.          PUT STRING (QSGRH(IT)) EDIT (SGRH(IT)) (X(3),F(7,0,-3));
267.          END PT025;
268. /* COMPUTE CAPITAL COSTS SUBTOTALS. */
269. SUBTOT = MATHAND + GASHAND + SO2ABS + SGRH + PURGE +
270.          REGEN + SLUDGE + ACIDPS + SULPS - ESPCRD;
271. MISC = 0.04 * SUBTOT;
272. DIRCCAP = SUBTOT + MISC + SPOND;
273. ARCHEXP = 0.09 * DIRCCAP;
274. CONSEXP = 0.16 * DIRCCAP;
275. CONTFEE = 0.05 * DIRCCAP;
276. SUBTOT2 = DIRCCAP + ARCHEXP + CONSEXP + CONTFEE;
277. CONTING = 0.2 * SUBTOT2;
278. CONTING(4) = 0.25 * SUBTOT2(4);
279. CONTING(7) = (0.25 + (PSC - 0.005) / 0.7) * SUBTOT2(7);
280. SHKDOWN = 0.1 * (1.2 * SUBTOT2 - SPOND);
281. INTRST = 0.1664 * 1.2 * SUBTOT2;
282. /* OPERATING AND MAINTENANCE COSTS */
283. CALL LEHON;
284. CALL LHSTONE;
285. CALL DUALKI;
286. CALL HGOXIDE;
287. CALL WELLRD;
288. CALL AQUCAR;
289. CALL LSDRY;
290. TOTVAR = LIME + LIMSTN + SODASH + MAGOX + COAL + CTLYST +
291.          ELECT + WATER + REHEAT + FUOIL + NATGAS - CREDIT;
292. TOTFIX = WSTDSP + LABOR + MAINT;
293. PLNTOM = 0.5 * TOTFIX;
294. ADMINOM = 0.1 * LABOR;
295. MRKTOH = 0.1 * (SULFUR + ACID);

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296.      /* O&M COST TOTALS, WORKING CAPITAL COST COMPUTATION          */
297.      NETOMC = TOTVAR + TOTFIX + PLNTOH + ADMINOH + HRKTOH -
298.      ACID - SULFUR;
299.      WORKCAP = 0.0833 * (TOTVAR - WATER);
300.      TOTCAP = SUBTOT2 + CONTING + SHKDOWN + INTRST + WORKCAP + LAND;
301.      /* TRANSFER DATA TO PRINTING ARRAYS                            */
302.      PT026: DO IT = 4 TO 6;
303.      PUT STRING(QMRKTOH(IT)) EDIT (HRKTOH(IT))(X(3),F(7,0,-3));
304.      END PT026;
305.      /* CALCULATE LEVELIZED CAPITAL AND OPERATING COSTS              */
306.      LEVCAP = FC(INEW) * TOTCAP / HW / 8760. / CF;
307.      LEVOP = LF(INEW) * NETOMC / HW / 8760. / CF;
308.      TOTLEV = LEVCAP + LEVOP;
309.      PUT FILE(OUTPUT) EDIT('CAP/HW',1,ICOAL,INW,INW,IREF,TOTCAP/HW)
310.      (R(FORMA));
311.      PUT FILE(OUTPUT) EDIT('LEVCAP',2,ICOAL,INW,INW,IREF,LEVCAP)
312.      (R(FORMB));
313.      PUT FILE(OUTPUT) EDIT('LEVOP',3,ICOAL,INW,INW,IREF,LEVOP)
314.      (R(FORMB));
315.      PUT FILE(OUTPUT) EDIT('TOTLEV',4,ICOAL,INW,INW,IREF,TOTLEV)
316.      (R(FORMB));
317.      FORMA: FORMAT(SKIP,A(6),(5)F(3),COL(25),(7)F(8,2,-3));
318.      FORMB: FORMAT(SKIP,A(6),(5)F(3),COL(25),(7)F(8,2));
319.      IF SWITCH(4) = 1 THEN CALL TABLE1;
320.      IF SWITCH(5) = 1 THEN CALL TABLE2;
321.      END PT02;
322.      PUT FILE(OUTPUT) EDIT('**END',(0 DO J=1 TO 5),
323.      (0.0 DO I=1 TO 7))(SKIP,A(6),(5)F(3),COL(25),(7)F(8,2));
324.      /* SUBROUTINE CONSTANT                                          */
325.      CONST: PROCEDURE;
326.      IF CHHV = 0.0 THEN PUT EDIT ('?(PTC01) CHHV = 0.0')(SKIP,A);
327.      IF CASH = 0.0 THEN PUT EDIT ('?(PTC02) CASH = 0.0')(SKIP,A);
328.      IF CATF = 0.0 THEN PUT EDIT ('?(PTC03) CATF = 0.0')(SKIP,A);
329.      CFR = 0.3 * HW * CFPE / CHHV;
330.      S02S1 = 2.0 * CSTF * PSC * CFR;
331.      S02S2 = 2.E6 * PSC * CSTF / CHHV;
332.      IF S02S2 >= 5.9 THEN DO;
333.      R = 0.9;
334.      S0 = (1.0 - R) * S02S2;
335.      IF S0 <= 1.2 THEN S = R * S02S1;
336.      IF S0 > 1.2 THEN DO;
337.      S0 = 1.2;
338.      S = (1.0 - (S0/S02S2)) * S02S1;
339.      END;
340.      END;
341.      IF S02S2 <= 2.1 THEN DO;
342.      R = 0.7;
343.      S0 = (1.0 - R) * S02S2;
344.      S = R * S02S1;
345.      END;
346.      IF S02S2 > 2.1 & S02S2 < 5.9 THEN DO;
347.      R = (1.0 - ((S02S2 - 0.6)/S02S2));
348.      S = S02S1 * R;
349.      END;
350.      ATP1 = CASH * CATF * CFR;
351.      ATP2 = 1.0 * 10.0 ** 6 * CASH * CATF / CHHV;
352.      IF ATP2 <= 3.0 THEN A = 0.0;
353.      ELSE A = ATP1 - (3. * ATP1 / ATP2);

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354.      /* COMPUTATION OF G                                     */
355.      LEFT = 1. - PSC - CASH - 0.0015;
356.      WPCL = 0.15; WPSUL = 100. * PSC;
357.      IF CHHV <= 8300. THEN DO;
358.          K6 = LEFT / 0.677;
359.          WPACT = WPX(1,X) * K6;
360.      END;
361.      IF CHHV >= 11000. THEN DO;
362.          K6 = LEFT / 0.9201;
363.          WPACT = WPX(2,X) * K6;
364.      END;
365.      IF CHHV < 11000. & CHHV > 8300. THEN DO;
366.          K6 = LEFT / 0.83;
367.          WPACT = WPX(3,X) * K6;
368.      END;
369.      F(1) = WPACT(1) * H(1) / H(7);
370.      F(2) = WPCL * H(2) / H(8);
371.      F(3) = WPSUL * CSTF * H(3) / H(9);
372.      F02C = WPACT(1) * H(4) / H(7);
373.      F02H = (WPACT(2) - WPCL * H(10) / H(8)) * H(4) / 4. / H(10);
374.      F02S = WPSUL * CSTF * H(4) / H(9);
375.      F(4) = (F02C + F02H + F02S - WPACT(3)) * XSF;
376.      O2R = F(4) * (1. + 1. / XSF);
377.      F(5) = WPACT(4) + (H2AIR/O2AIR) * O2R;
378.      FH2OH = H(6) * (WPACT(2) - WPCL * H(10) / H(8)) / 2. / H(10);
379.      FH2OA = (H2OAIR/O2AIR) * O2R;
380.      F(6) = FH2OH + FH2OA + WPACT(5);
381.      FG = F(1)/H(1) + F(2)/H(2) + F(3)/H(3) + F(4)/H(4) + F(5)/H(5)
382.          + F(6)/H(6);
383.      FGI = 100. / FG;
384.      CFR = 1000. * HW * CFPE / CHHV;
385.      SCFH = 379. * CFR / 60. / FGI;
386.      G = SCFH * (THG + 460.) / 520.;
387.      RETURN;
388.  END CONST;
389.  /* LEMON: LINE FGD COSTS                                     */
390.  LEMON: PROCEDURE;
391.      LINE(1) = 8472. * S * CF * LHCO;
392.      ELECT(1) = (9.22E-3 * G ** .945 + 22.45 * S) * 8.76 * CF * ELCO;
393.      WATER(1) = (1.607E-5 * G + 0.848 * S) * 8760. * CF * WTRC;
394.      REHEAT(1) = 0.3967 * G * CF * STHC;
395.      LABOR(1) = (0.046 * HW ** 0.693 + 26.4 * PSC) * 8760. *
396.          CF * LBCO;
397.      MAINT(1) = 0.178 * HW ** -0.129 * (DIRCCAP(1) - SPOND(1)) +
398.          0.03 * SPOND(1);
399.      LAND(1) = (10. + 1.526 * S * CF * BRLY) * LNDC;
400.      PUT STRING(QLINE(1)) EDIT (LINE(1)) (X(3),F(7,0,-3));
401.      PUT STRING(QREHEAT(1)) EDIT (REHEAT(1)) (X(3),F(7,0,-3));
402.      RETURN;
403.  END LEMON;
404.  /* LIMESTONE COSTS SUBROUTINE                                 */
405.  LMSTONE: PROCEDURE;
406.      LIMSTN(2) = 19770. * S * CF * LSCD;
407.      ELECT(2) = (6.21E-3 * G ** 0.98 + 54.25 * S) * 8.76 * CF * ELCO;
408.      WATER(2) = (1.68E-5 * G ** 0.996 + 1.04 * S) * 8760. *
409.          CF * WTRC;
410.      REHEAT(2) = (2.13E-5 * G ** 1.05 + 0.576 * S) * 8760. *
411.          CF * STHC;
412.      LABOR(2) = (0.046 * HW ** 0.693 + 26.4 * PSC) * 8760 *
413.          CF * LBCO;
414.      MAINT(2) = 0.178 * HW ** -0.129 * (DIRCCAP(2) - SPOND(2)) +
415.          0.03 * SPOND(2);
416.      LAND(2) = (10. + 1.862 * S * CF * BRLY) * LNDC;
417.      PUT STRING(QLIMSTN(2)) EDIT (LIMSTN(2)) (X(3),F(7,0,-3));
418.      PUT STRING(QREHEAT(2)) EDIT (REHEAT(2)) (X(3),F(7,0,-3));
419.      RETURN;
420.  END LMSTONE;

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421.      /* DUAL ALKALI COSTS. IT=3                                */
422.      DUALKL: PROCEDURE;
423.          LIME(3) = 8068. * S * CF * LMCO;
424.          SODASH(3) = 320. * S * CF * SACO;
425.          ELECT(3) = (2.19E-3 * G + 76.76 * S) * 8.76 * CF * ELCO;
426.          WATER(3) = (1.97E-5 * G + 0.408 * S) * 8760. * CF * WTRC;
427.          REHEAT(3) = 0.397 * G * CF * STHC;
428.          LABOR(3) = (0.084 * MW ** 0.639 + 34.25 * PSC) *
429.                      8760. * CF * LBCO;
430.          MAINT(3) = 0.182 * MW ** -0.244 * (DIRCCAP(3) - SPOND(3)) +
431.                      0.03 * SPOND(3);
432.          LAND(3) = (10. + 1.519 * S * CF * BRLY) * LNDC;
433.          PUT STRING(QLIME(3)) EDIT (LIME(3)) (X(3),F(7,0,-3));
434.          PUT STRING(QSODASH(3)) EDIT (SODASH(3)) (X(3),F(7,0,-3));
435.          PUT STRING(QREHEAT(3)) EDIT (REHEAT(3)) (X(3),F(7,0,-3));
436.          RETURN;
437.      END DUALKL;
438.      /* WELLMAN LORD COSTS                                        */
439.      WELLRD: PROCEDURE;
440.          SODASH(5) = 10900. * CF * S ** 0.034 * SACO;
441.          ELECT(5) = (5.72E-3 * G ** 0.98 + 25.83 * S) * 8.76 * CF * ELCO;
442.          WATER(5) = (4.16E-4 * G ** 0.978 + 27.72 * S) * 8760. *
443.                      CF * WTRC;
444.          REHEAT(5) = 1.28 * G * CF * STHC;
445.          NATGAS(5) = 111020. * (4380. * S - 2836. * S ** 0.034) * CF *
446.                      GASC / 8760.;
447.          CREDIT(5) = 5800. * (4380. * S - 2836. * S ** 0.034) * CF *
448.                      STHC / 8760.;
449.          LABOR(5) = (0.083 * MW ** 0.701 + 49.3 * PSC) * 8760. *
450.                      CF * LBCO;
451.          MAINT(5) = 0.173 * MW ** -0.146 * (DIRCCAP(5) - SPOND(5)) +
452.                      0.03 * SPOND(5);
453.          SULFUR(5) = (4380. * S - 2836. * S ** 0.034) * CF * SULC;
454.          LAND(5) = 16. * LNDC;
455.          PUT STRING(QSODASH(5)) EDIT (SODASH(5)) (X(3),F(7,0,-3));
456.          PUT STRING(QREHEAT(5)) EDIT (REHEAT(5)) (X(3),F(7,0,-3));
457.          PUT STRING(QNATGAS(5)) EDIT (NATGAS(5)) (X(3),F(7,0,-3));
458.          PUT STRING(QSULFUR(5)) EDIT ((' ',SULFUR(5),' '))
459.                      (X(2),A,F(7,0,-3),A);
460.          PUT STRING(QCREDIT(5)) EDIT ((' ',CREDIT(5),' '))
461.                      (X(2),A,F(7,0,-3),A);
462.          RETURN;
463.      END WELLRD;
464.      /* MAGNESIUM OXIDE FGD CAPITAL COST                          */
465.      HGOXIDE: PROCEDURE;
466.          LIMSTN(4) = 10.18 * CF * MW ** 0.962 * ALSOC;
467.          MAGOX(4) = 205. * S * CF * MGCOC;
468.          CTLYST(4) = 225. * S * CF * CATC;
469.          ELECT(4) = (5.526E-3 * G ** 0.98 + 243.7 * S) * 8.76 *
470.                      CF * ELCO;
471.          WATER(4) = (5.54E-5 * G ** 0.978 + 27.5 * S) * 8760. *
472.                      CF * WTRC;
473.          REHEAT(4) = 0.408 * G * CF * STHC;
474.          FUOIL(4) = 788200. * S * CF * FOLOC;
475.          CREDIT(4) = 17070. * S * CF * STHC;
476.          LABOR(4) = (0.084 * MW ** 0.701 + 49.79 * PSC) * 8760. *
477.                      CF * LBCO;
478.          MAINT(4) = 0.173 * MW ** -0.146 * (DIRCCAP(4) - SPOND(4)) +
479.                      0.03 * SPOND(4);
480.          ACID(4) = 13688. * S * CF * ACDC;
481.          LAND(4) = 16. * LNDC;
482.          PUT STRING(QLIMSTN(4)) EDIT (LIMSTN(4)) (X(3),F(7,0,-3));
483.          PUT STRING(QMAGOX(4)) EDIT (MAGOX(4)) (X(3),F(7,0,-3));
484.          PUT STRING(QCTLYST(4)) EDIT (CTLYST(4)) (X(3),F(7,0,-3));
485.          PUT STRING(QREHEAT(4)) EDIT (REHEAT(4)) (X(3),F(7,0,-3));
486.          PUT STRING(QFUOIL(4)) EDIT (FUOIL(4)) (X(3),F(7,0,-3));
487.          PUT STRING(QCREDIT(4)) EDIT ((' ',CREDIT(4),' '))
488.                      (X(2),A,F(7,0,-3),A);
489.          PUT STRING(QACID(4)) EDIT ((' ',ACID(4),' '))
490.                      (X(2),A,F(7,0,-3),A);
491.          RETURN;
492.      END HGOXIDE;

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493. /* AQUEOUS CARBONATE PROCESS
494. AQUICAR: PROCEDURE;
495. SODASH(6) = 1309. * S * CF * SACO;
496. COAL(6) = 6181. * S * CF * COLC;
497. CTLYST(6) = 0.01 * COAL(6);
498. ELECT(6) = 0.0553 * G * CF * ELCO;
499. WATER(6) = 2.2045 * G * CF * WTRC * (1. + 9. * (PSC - .035));
500. FUOIL(6) = 3.14E5 * S * CF * FOLC;
501. CREDIT(6) = 40100. * S * CF * STMC;
502. LABOR(6) = (0.09 * MW ** .701 + 54.3 * PSC) * 8760. *
503. CF * LBCO;
504. MAINT(6) = 0.172 * MW ** -.146 * (DIRCCAP(6) - SPOND(6)) +
505. 0.03 * SPOND(6);
506. SULFUR(6) = 4380. * S * CF * SULC;
507. LAND(6) = 16. * LANDC;
508. PUT STRING(QSODASH(6)) EDIT (SODASH(6)) (X(3),F(7,0,-3));
509. PUT STRING(QCOAL(6)) EDIT (COAL(6)) (X(3),F(7,0,-3));
510. PUT STRING(QCTLYST(6)) EDIT (CTLYST(6)) (X(3),F(7,0,-3));
511. PUT STRING(QFUOIL(6)) EDIT (FUOIL(6)) (X(3),F(7,0,-3));
512. PUT STRING(QCREDIT(6)) EDIT ((' ',CREDIT(6),' '))
513. (X(2),A,F(7,0,-3),A);
514. PUT STRING(QSULFUR(6)) EDIT ((' ',SULFUR(6),' '))
515. (X(2),A,F(7,0,-3),A);
516. RETURN;
517. END AQUICAR;
518. /* LIKE SPRAY DRYER EQUATIONS
519. LSDRY: PROCEDURE;
520. LINE(7) = 9329. * S * CF * LMCO;
521. ELECT(7) = 0.0363 * G * CF * ELCO;
522. WATER(7) = 0.0676 * G * CF * WTRC * (1. + 9. * (PSC - .035));
523. WSTDSP(7) = (2. * S + A) * 292.00 * THGE * CF;
524. LABOR(7) = (0.046 * MW ** 0.693 + 26.4 * PSC) * 8760. *
525. CF * LBCO;
526. MAINT(7) = 0.17 * MW ** -.168 * (DIRCCAP(7) - SPOND(7)) +
527. .03 * SPOND(7);
528. LAND(7) = (10. + 4.022E-1 * (2. * S + A) * CF * BRLY) * LANDC;
529. PUT STRING(QLINE(7)) EDIT (LINE(7)) (X(3),F(7,0,-3));
530. PUT STRING(QWSTDSP(7)) EDIT (WSTDSP(7)) (X(3),F(7,0,-3));
531. RETURN;
532. END LSDRY;
533. /* TABLE1 SUBROUTINE: CAPITAL COSTS
534. TABLE1: PROCEDURE;
535. ITABLE = ITABLE + 1;
536. PUT EDIT ('TABLE G-1.',ITABLE,TITLEA,RUNNAME,BL,BL)
537. (SKIP,A,F(3),X(3),A,COL(110),A,(2)(SKIP,A));
538. PUT EDIT ('APPLICATION:',APPLTN(INEW), ' REGION:',REGNAME(IREG),
539. ' PLANT SIZE:',MW, ' MW', ' COAL:',PSC, ' * SULFUR',BL,BL)
540. (SKIP,COL(15),A,X(1),A,X(4),A,X(1),A,X(4),A,F(3),A,X(4),A,
541. F(6,2,2),A,SKIP,A,SKIP,A);
542. PUT EDIT ((' (NAME2(I,J) DO I=1 TO 7) DO J=1 TO 2))
543. (SKIP,COL(41), (7)(X(2),A(11)));
544. PUT EDIT ('DIRECT INVESTMENT',((11) '-' DO I=1 TO 7))
545. (SKIP,A,COL(42), (7)(X(1),A(11),X(1)));
546. PUT EDIT ('-----',BL)(SKIP,A,SKIP,A);
547. PUT EDIT (TITLE1(1),HATHAND)(R(FORM1));
548. PUT EDIT (TITLE1(2),GASHAND)(R(FORM1));
549. PUT EDIT (TITLE1(3),QPURGE)(R(FORM2));
550. PUT EDIT (TITLE1(4),SO2ABS)(R(FORM1));
551. PUT EDIT (TITLE1(5),QSGRH)(R(FORM2));
552. PUT EDIT (TITLE1(6),QREGEX)(R(FORM2));
553. PUT EDIT (TITLE1(7),QSLUDGE)(R(FORM2));
554. PUT EDIT (TITLE1(8),QACIDPS)(R(FORM2));
555. PUT EDIT (TITLE1(9),QSULPS)(R(FORM2));
556. PUT EDIT (TITLE1(10),RESPOND)(R(FORM2));
557. PUT EDIT (TITLE1(11),MISC)(R(FORM1));
558. PUT EDIT (TITLE1(12),QSPOND)(R(FORM2));
559. PUT EDIT (BL)(SKIP,A);
560. PUT EDIT (TITLE1(13),DIRCCAP)(R(FORM1));

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561. PUT EDIT (BL, 'INDIRECT INVESTMENT', '-----', BL)
562. (SKIP, A);
563. PUT EDIT (TITLE1(14), TITLE1(15), ARCHEXP) (R(FORM3));
564. PUT EDIT (TITLE1(16), CONSEXP) (R(FORM1));
565. PUT EDIT (TITLE1(17), CONTFEE) (R(FORM1));
566. PUT EDIT (TITLE1(18), CONTING) (R(FORM1));
567. PUT EDIT (TITLE1(19), SHKDOWN) (R(FORM1));
568. PUT EDIT (TITLE1(20), INTRST) (R(FORM1));
569. PUT EDIT (TITLE1(21), LAND) (R(FORM1));
570. PUT EDIT (TITLE1(22), WORKCAP) (R(FORM1));
571. PUT EDIT (BL) (SKIP, A);
572. PUT EDIT (TITLE1(23), TOTCAP) (R(FORM1));
573. PUT EDIT ((BL DO I=1 TO 17)) (SKIP, A);
574. PUT EDIT ('NOTE: AQUEOUS CARBONATE SYSTEM: SO2 ABSORPTION COST',
575. ' INCLUDES THE ESP CREDIT.') (SKIP, A, A);
576. PUT EDIT ((BL DO I=1 TO 8)) (SKIP, A);
577. RETURN;
578. FORM2: FORMAT(SKIP, A, COL(41), (7)A(13));
579. FORM1: FORMAT(SKIP, A, COL(41), (7)(X(3), F(7, 0, -3), X(3)));
580. FORM3: FORMAT(SKIP, A, SKIP, A, COL(41), (7)(X(3), F(7, 0, -3), X(3)));
581. END TABLE1;
582. /* TABLE2 PROCEDURE: O&M COSTS */
583. TABLE2: PROCEDURE;
584. DECLARE NYEAR(2) FIXED DEC INIT(30, 20);
585. ITABLE = ITABLE + 1;
586. PUT EDIT ('TABLE G-1.', ITABLE, TITLEB, RUNNAME, BL, BL)
587. (SKIP, A, F(3), X(3), A, COL(110), A, (2)(SKIP, A));
588. PUT EDIT ('APPLICATION:', APPLTN(INEW), ' REGION:', REGNAME(IREG),
589. ' PLANT SIZE:', HW, ' MW', ' COAL:', PSC, ' % SULFUR', BL, BL)
590. (SKIP, COL(15), A, X(1), A, X(4), A, X(1), A, X(4), A, F(3), A, X(4), A,
591. F(6, 2, 2), A, SKIP, A, SKIP, A);
592. PUT EDIT ((NAME2(1, J) DO I=1 TO 7) DO J=1 TO 2))
593. (SKIP, COL(41), (7)(X(2), A(11)));
594. PUT EDIT ('OPERATING COST', ((11) DO I=1 TO 7))
595. (SKIP, A, COL(42), (7)(X(1), A(11), X(1)));
596. PUT EDIT('-----')(SKIP, A);
597. PUT EDIT (BL, ' (VARIABLE)', BL, 'RAW MATERIAL')(SKIP, A);
598. PUT EDIT('-', TITLE2(1), QLINE) (R(FORM1));
599. PUT EDIT('-', TITLE2(2), QLINSTN) (R(FORM1));
600. PUT EDIT('-', TITLE2(3), QSODASH) (R(FORM1));
601. PUT EDIT('-', TITLE2(4), QHAGOX) (R(FORM1));
602. PUT EDIT('-', TITLE2(5), QCOAL) (R(FORM1));
603. PUT EDIT('-', TITLE2(6), QCTLYST) (R(FORM1));
604. PUT EDIT ('UTILITIES')(SKIP, A);
605. PUT EDIT('-', TITLE2(7), ELECT) (R(FORM2));
606. PUT EDIT('-', TITLE2(8), WATER) (R(FORM2));
607. PUT EDIT('-', TITLE2(9), QREHEAT) (R(FORM1));
608. PUT EDIT('-', TITLE2(10), QFUEL) (R(FORM1));
609. PUT EDIT('-', TITLE2(11), QNATGAS) (R(FORM1));
610. PUT EDIT('-', TITLE2(12), QCREDIT) (R(FORM1));
611. PUT EDIT (BL) (SKIP, A);
612. PUT EDIT (TITLE2(13), TOTWAR) (R(FORM3));
613. PUT EDIT (BL, ' (FIXED)')(SKIP, A);
614. PUT EDIT (TITLE2(14), QWSTDSP) (R(FORM5));
615. PUT EDIT ('LABOR')(SKIP, A);
616. PUT EDIT('-', TITLE2(15), LABOR) (R(FORM2));
617. PUT EDIT ('MAINTENANCE')(SKIP, A);
618. PUT EDIT('-', TITLE2(16), MAINT) (R(FORM2));
619. PUT EDIT (BL) (SKIP, A);
620. PUT EDIT (TITLE2(17), TOTFIX) (R(FORM3));
621. PUT EDIT (BL) (SKIP, A);
622. PUT EDIT ('OVERHEAD')(SKIP, A);
623. PUT EDIT('-', TITLE2(18), PLNTOH) (R(FORM2));
624. PUT EDIT('-', TITLE2(19), ADMINOH) (R(FORM2));
625. PUT EDIT('-', TITLE2(20), QMRKTOH) (R(FORM1));

```

```

626.      PUT EDIT(BL,'BYPRODUCT SALES')(SKIP,A);
627.      PUT EDIT('-',TITLE2(21),QACID)(R(FORM1));
628.      PUT EDIT('-',TITLE2(22),QSULFUR)(R(FORM1));
629.      PUT EDIT (BL)(SKIP,A);
630.      PUT EDIT(TITLE2(23),NETOHC)(R(FORM3));
631.      PUT EDIT(BL,'LEVELIZED - ',NYEAR(INEW),' YEARS',(20)('-'))
632.      (SKIP,A,SKIP,A,F(2),A,SKIP,A);
633.      PUT EDIT('-',TITLE2(24),LEVCAP)(R(FORM6));
634.      PUT EDIT('-',TITLE2(25),LEVOP)(R(FORM6));
635.      PUT EDIT(BL)(SKIP,A);
636.      PUT EDIT(TITLE2(26),TOTLEV)(R(FORM7));
637.      PUT EDIT((BL DO I=1 TO 10))(SKIP,A);
638.      RETURN;
639. FORM1:  FORMAT(SKIP,COL(3),A,A,COL(41),(7)A(13));
640. FORM2:  FORMAT(SKIP,COL(3),A,A,COL(41),(7)(X(3),F(7,0,-3),X(3)));
641. FORM3:  FORMAT(SKIP,COL(10),A(31),COL(41),(7)(X(3),F(7,0,-3),X(3)));
642. FORM4:  FORMAT(SKIP,A,COL(41),(7)(X(3),F(7,0,-3),X(3)));
643. FORM5:  FORMAT(SKIP,A,COL(41),(7)A(13));
644. FORM6:  FORMAT(SKIP,COL(3),A,A,COL(41),(7)(X(3),F(7,2),X(3)));
645. FORM7:  FORMAT(SKIP,COL(10),A(31),COL(41),(7)(X(3),F(7,2),X(3)));
646.      END TEST;

```

7

6.2 TABULATION ROUTINE FOR MAIN PROGRAM

```

1.  /* PROGRAM TO TABULATE THE OUTPUT FILE FROM TESTX */
2.  TABLE4: PROCEDURE OPTIONS(MAIN);
3.  DECLARE
4.      COST(2,2,7,4,14)      DEC FLOAT /* :INW,IMW,ICOL,IT,IVAR,*/
5.      INIT((3164)-99.99),
6.      XCOST(7)              DEC FLOAT, /* :IT
7.      REGION(14)           CHAR(8) /* :IREG
8.      INIT('ECAR','ERCOT','MAAC','MAIN','MARCA-1','MARCA-2',
9.      'NPCC','SERC','SPP-1','SPP-2','WSCC-1','WSCC-2',
10.      'WSCC-3','WSCC-4'),
11.      APPLTN(2)            CHAR(8) /* :INW
12.      INIT('NEW','RETROFIT'),
13.      MWSIZE(2)            FIXED DEC /* :IMW MW SIZE
14.      INIT(500,100),
15.      SO2RMV(2)           CHAR(4) /* :TTT SO2 REMOVAL RATE
16.      INIT('HIGH','LOW'),
17.      FIELD_NAME          CHAR(6), /* INPUT FIELD
18.      DASH                CHAR(20) /* UNDERSCORE
19.      INIT((20)='-'),
20.      (IT,IREG,INW,ICOL,IMW,ITAB) /* MISC. INDICES
21.      FIXED DEC,
22.      RUNNAME             CHAR(20), /* RUNNAME
23.      FGD_TYPE(7,2)       CHAR(10) /* :IT,2 NAME OF FGD SYSTEM
24.      INIT('LIME','','LIMESTONE','','DUAL','ALKALI','MAGNESIA',
25.      'SLURRY','WELLMAN','LORD','AQUEOUS','CARBONATE',
26.      'LIME SPRAY','DRYER'),
27.      (YSYSTEM(7),ZSYSTEM(7)) CHAR(5) /* :IP SHORT NAME OF FGD
28.      INIT('',' ',' DA',' ',' NGO',' ',' WL',' ',' AC',' ',' LSD'),
29.      TEMP                FIXED DEC, /* TEMPORARY STORAGE
30.      (PNTR(7),IPNTR(7))  FIXED DEC /* POINTER ARRAYS FOR SORT
31.      INIT(1,2,3,4,5,6,7),
32.      SO2RQD(2,14)        FIXED DEC /* :ICOL,IREG SO2 REMOVAL
33.      INIT(90,80,80,90,80,90,80,90,80,90,70,70,(14)70),
34.      (YCOST(7),ZCOST(7)) DEC FLOAT, /* :IP SORT ARRAY
35.      (IP,IPP,IPPP)       FIXED DEC, /* SORTING INDICES
36.      BL                  CHAR(132) /* BLANK LINE
37.      INIT((132)=' '),
38.      VARNAME(4)          CHAR(6) /* :IVAR NAME OF VARIABLES
39.      INIT('CAP/KW','LEVCAP','LEVOP','LEVTOT');
40.  /* MAIN BODY OF PROGRAM
41.  OPEN FILE (SYSIN) INPUT STREAM,
42.  FILE(SYSPRINT) OUTPUT STREAM LINESIZE(132);
43.  GET FILE(SYSIN) EDIT (RUNNAME)(SKIP,A(20));
44.  ITAB = 0;
45.  /* READ IN DATA
46.  TBOO: DO I = 1 TO 500 WHILE (FIELD_NAME NE '**END');
47.  GET FILE(SYSIN) EDIT (FIELD_NAME,IVAR,ICOL,IMW,INW,IREG,XCOST)
48.  (SKIP,A(6),(5)F(3),COL(25),(7)F(8,2));
49.  IF FIELD_NAME NE '**END' THEN DO;
50.  IF IVAR > 4 OR IVAR < 1 THEN PUT EDIT('T(TBOO1) IVAR OUT OF ',
51.  'RANGE, I=',I)(SKIP,A,A,F(2));
52.  IF ICOL > 2 OR ICOL < 1 THEN PUT EDIT('T(TBOO2) ICOL OUT',
53.  ' OF RANGE, I=',I)(SKIP,A,A,F(2));
54.  IF IMW > 2 OR IMW < 1 THEN PUT EDIT('T(TBOO3) IMW OUT OF ',
55.  'RANGE, I=',I)(SKIP,A,A,F(2));
56.  IF INW > 2 OR INW < 1 THEN PUT EDIT('T(TBOO4) INW OUT OF ',
57.  'RANGE, I=',I)(SKIP,A,A,F(2));
58.  IF IREG > 14 OR IREG < 1 THEN PUT EDIT('T(TBOO5) IREG OUT OF ',
59.  'RANGE, I=',I)(SKIP,A,A,F(2));
60.  COST(INW,IMW,ICOL,*,IVAR,IREG) = XCOST;
61.  END;
62.  END TBOO;

```



```

63.      /* SORT COST ARRAY                                     */
64.      TB01: DO INEW = 1 TO 2; DO IMW = 1 TO 2;
65.
66.          ITAB = ITAB + 1;                                     /* EIGHT TABLES */
67.          PUT EDIT ('TABLE G-2.',ITAB,' FGD SYSTEMS RANKED BY ', /* UP TABLE COUNTER */
68.              'TOTAL LEVELIZED COST',RUNNAME)
69.              (SKIP,A,F(1),A,A,COL(110),A);
70.          PUT EDIT (BL,BL)(SKIP,A);
71.          PUT EDIT ('APPLICATION: ',APPLTH(INEW),'          PLANT SIZE: ',
72.              HWSIZE(IMW),' MW')
73.              (SKIP,COL(25),A,A,A,F(3),A,A,A);
74.          PUT EDIT(BL,BL)(SKIP,A);
75.          PUT EDIT ('REMOVAL','LIME-', 'FGD SYSTEM/LEVELIZED TOTAL COST',
76.              '(MILLS/KWH)')(SKIP,COL(10),A,COL(29),A,COL(52),A,A);
77.          PUT EDIT ('REGION','REQUIRED','LIME','STONE','RANK>',
78.              1,2,3,4,5)(SKIP,A,COL(10),A,COL(21),A,COL(29),A,COL(37),A,
79.              COL(42),(5)(X(7),F(1),X(6)));
80.          PUT EDIT((DASH DO I=1 TO 10))(SKIP,A(6),COL(10),A(8),COL(21),
81.              A(6),COL(29),A(6),COL(37),A(5),COL(42),(5)(X(2),A(10),X(2)));
82.      TB09: DO ICOAL = 1 TO 2;
83.          PUT EDIT (BL,S02RMV(ICOAL),' SULFUR COAL',BL)
84.              (SKIP,A,SKIP,COL(10),A,A,SKIP,A);
85.      TB02: DO IREG = 1 TO 14;
86.          YCOST = COST(INEW,IMW,ICOAL,*,4,IREG);
87.          PNTR = IPNTR;
88.      TB04: DO IP = 3 TO 6;                                     /* CURRENT POINTER TO FILL */
89.      TB05: DO IPP = IP+1 TO 7;                                   /* POINTERS TO RIGHT */
90.          IF YCOST(PNTR(IP)) > YCOST(PNTR(IPP)) THEN DO;
91.              TEMP = PNTR(IPP);                                  /* SAVE MIN POINTER */
92.      TB06: DO IPPP = IPP TO IP+1 BY -1;                         /* PUSH POINTERS TO RIGHT */
93.          PNTR(IPPP) = PNTR(IPPP-1);
94.          END TB06;
95.          PNTR(IP) = TEMP;
96.          END;
97.          END TB05;
98.          END TB04;                                           /* ALL POINTERS IN ORDER */
99.      TB07: DO IP=1 TO 7;
100.          ZCOST(IP) = YCOST(PNTR(IP));
101.          ZSYSTEM(IP) = YSYSTEM(PNTR(IP));
102.          END TB07;
103.      /* COST ARRAY FILLED-- TABULATE DATA                                     */
104.          PUT EDIT(REGION(IREG),S02RMD(ICOAL,IREG),'Z',
105.              (ZCOST(I) DO I=1,2),
106.              (ZSYSTEM(IP),ZCOST(IP) DO IP=3 TO 7))(R(FORMC));
107.      END TB02;
108.      END TB09;
109.          PUT EDIT ((BL DO I=1 TO 4))(SKIP,A);
110.          PUT EDIT ('*GREATER THAN 70% SO2 REMOVAL HAS NOT BEEN ',
111.              'DEMONSTRATED FOR LSD SYSTEM')(SKIP,A,A);
112.          PUT EDIT (BL,'LEGEND:', 'DA - DUAL ALKALI',
113.              'MGO - MAGNESIA SLURRY', 'WL - WELLMAN LOKD',
114.              'AC - AQUEOUS CARBONATE', 'LSD - LIME SPRAY DRYER')
115.              (SKIP,A,SKIP,A,COL(10),A,COL(35),A,COL(60),A,
116.              SKIP,COL(10),A,COL(35),A);
117.          PUT EDIT((BL DO I=1 TO 15))(SKIP,A);
118.      FORMC: FORMAT(SKIP,A,COL(13),F(2),A,COL(22),F(5,2),COL(30),F(3,2),
119.          COL(42),(5)(X(2),A,F(5,2),X(2)));
120.      END TB01;
121.      END TABLE4;

```

6.3 INPUT DATA FOR MAIN PROGRAM

```

1.  *
2.  * DATA FILE FOR FGD
3.  *
4.  * COAL SPECIFIC DATA (ICOAL,IREG)
5.  *
6.  * H=HIGH SULFUR COAL, L=LOW SULFUR COAL.
7.  * REGIONS 1-7 ON 1ST LINE, REGIONS 8-14 ON NEXT LINE, ETC.
8.  *
9.  PSC H1-7 : 0.0365 0.010 0.019 0.034 0.0095 0.035 0.019
10. PSC H8-14: 0.035 0.0275 0.0375 0.0125 0.0095 0.0115 0.01
11. PSC L1-7 : 0.012 0.0075 0.0125 0.011 0.0075 0.01 0.0125
12. PSC L8-14: 0.012 0.008 0.0105 0.0095 0.005 0.0055 0.0055
13. CASH H1-7: 0.142 0.104 0.149 0.122 0.091 0.108 0.133
14. CASH H-14: 0.132 0.129 0.126 0.110 0.09 0.102 0.159
15. CASH L1-7: 0.13 0.104 0.149 0.102 0.091 0.093 0.133
16. CASH L-14: 0.129 0.116 0.089 0.110 0.090 0.102 0.159
17. CHHV H1-7: 11500. 6650. 12100. 10800. 6050. 11100. 12050.
18. CHHV H-14: 11150. 8750. 11900. 8100. 9350. 11050. 9850.
19. CHHV L1-7: 11450. 7150. 12050. 10450. 7500. 9600. 12150.
20. CHHV H-14: 11400. 8750. 10250. 9250. 9350. 11050. 9850.
21. *
22. * REGIONAL DATA- (IREG) MATERIAL AND LABOR COSTS
23. *
24. * REGIONS 1-7 ON 1ST LINE, REGIONS 8-14 ON NEXT LINE, ETC.
25. *
26. LNDC 1-7: 4030. 860. 5370. 5300. 1070. 6650. 5370.
27. LNDC 8-14: 1630. 1020. 2260. 2740. 1350. 3440. 1350.
28. LMCO 1-7: 64. 65. 56. 52. 60. 66. 81.
29. LMCO 8-14: 75. 69. 76. 89. 69. 63. 66.
30. ELCO 1-7 : 29. 29. 29. 29. 29. 29. 29.
31. ELCO 8-14: 29. 29. 29. 29. 29. 29. 29.
32. WTRC 1-7 : .12 .12 .12 .12 .12 .12 .12
33. WTRC 8-14: .12 .12 .12 .12 .12 .12 .12
34. LRCO 1-7 : 12.5 12.5 12.5 12.5 12.5 12.5 12.5
35. LRCO 8-14: 12.5 12.5 12.5 12.5 12.5 12.5 12.5
36. LSCO 1-7 : 11. 17. 11. 11. 22. 22. 18.
37. LSCO 8-14: 8. 15. 14. 34. 20. 32. 24.
38. SACO 1-7 : 123. 124. 137. 114. 117. 115. 141.
39. SACO 8-14: 134. 123. 127. 110. 109. 139. 160.
40. FOLC 1-7 : 0.84 0.88 0.83 1.11 1.0 0.75 0.8
41. FOLC 8-14: 0.66 0.85 0.62 1.0 1.1 0.95 0.9
42. GASC 1-7 : 1.01 2.27 3.01 2.75 1.66 2.66 2.71
43. GASC 8-14: 2.33 2.19 2.48 2.38 2.59 3.6 2.5
44. COLC 1-7 : 31.5 18.5 32.0 29.5 11.0 26.5 39.5
45. COLC 8-14: 37.5 19.0 31.0 15.5 14.0 17.5 15.0
46. MGCO 1-7 : 206. 191. 212. 203. 195. 197. 212.
47. MGCO 8-14: 206. 188. 197. 163. 173. 173. 176.
48. STMC 1-7 : 2. 2. 2. 2. 2. 2. 2.
49. STMC 8-14: 2. 2. 2. 2. 2. 2. 2.
50. *

```

```

51.  * POWER LAW CONSTANTS
52.  *
53.  * ARRAY EH - (INew,IVAR,IFGD) 7 FGD SYSTEMS PER LINE.
54.  *
55.  * NEW SYSTEMS
56.  *
57.  MATHAND : 353639. 374195. 282042. 156052. 205900. 237000. 400000.
58.  FEEDPREP : 186357. 625821. 212768. 83953. 0.0 0.0 200000.
59.  GASHAND : 6.2425 5.8779 7.69931 8.3529 8.4957 9.0815 7.2134
60.  PURGE : 0.0 0.0 0.0 7.2873 3.8060 0.0 0.0
61.  SO2ABS : 25.3357 26.6816 11.64089 7.034 11.0262 12.6001 43.0263
62.  SGRH : 1.8395 3.0634 3.0634 1.9464 1.7966 0.0 0.0
63.  REGEN : 0.0 0.0 90438. 2390710. 2687000. 2602300. 0.0
64.  SLUDGE : 761274. 795925. 962948. 0.0 0.0 0.0 215500.
65.  ACIDPS : 0.0 0.0 0.0 1442148. 0.0 0.0 0.0
66.  SULPS : 0.0 0.0 0.0 0.0 1794000. 721200. 0.0
67.  ESPCREd : 0.0 0.0 0.0 0.0 0.0 0.0 98.5
68.  SPOND : 754748. 848660. 733463. 0.0 0.0 0.0 0.0
69.  *
70.  * RETROFIT SYSTEMS - COEFFICIENTS WILL BE CALCULATED
71.  *
72.  MATHAND :0.0 0.0 0.0 0.0 0.0 0.0 0.0
73.  FEEDPREP :0.0 0.0 0.0 0.0 0.0 0.0 0.0
74.  GASHAND :0.0 0.0 0.0 0.0 0.0 0.0 0.0
75.  PURGE :0.0 0.0 0.0 0.0 0.0 0.0 0.0
76.  SO2ABS :0.0 0.0 0.0 0.0 0.0 0.0 0.0
77.  SGRH :0.0 0.0 0.0 0.0 0.0 0.0 0.0
78.  REGEN :0.0 0.0 0.0 0.0 0.0 0.0 0.0
79.  SLUDGE :0.0 0.0 0.0 0.0 0.0 0.0 0.0
80.  ACIDPS :0.0 0.0 0.0 0.0 0.0 0.0 0.0
81.  SULPS :0.0 0.0 0.0 0.0 0.0 0.0 0.0
82.  ESPCREd :0.0 0.0 0.0 0.0 0.0 0.0 0.0
83.  SPOND :0.0 0.0 0.0 0.0 0.0 0.0 0.0
84.  *
85.  * ARRAY B: POWERS. (IVAR,IT)
86.  *
87.  MATHAND : 0.7486 0.6588 0.7835 0.6553 0.71 0.71 0.73
88.  FEEDPREP : 0.5499 0.4442 0.5930 0.5506 0.0 0.0 0.55
89.  GASHAND : 0.9437 0.9479 0.9278 0.9281 0.928 0.928 0.944
90.  PURGE : 0.0 0.0 0.0 0.9441 0.944 0.0 0.0
91.  SO2ABS : 0.8930 0.8931 0.9531 0.9516 0.95 0.95 0.89
92.  SGRH : 0.9443 0.9084 0.9084 0.9355 0.94 0.0 0.0
93.  REGEN : 0.0 0.0 0.59685 0.5706 0.57 0.57 0.0
94.  SLUDGE : 0.3310 0.3306 0.57307 0.0 0.0 0.0 0.6
95.  ACIDPS : 0.0 0.0 0.0 0.6871 0.0 0.0 0.0
96.  SULPS : 0.0 0.0 0.0 0.0 0.7 0.7 0.0
97.  ESPCREd : 0.0 0.0 0.0 0.0 0.0 0.0 0.8
98.  SPOND : 0.77818 0.7908 0.7632 0.0 0.0 0.0 0.0
99.  *
100. * CEE - SLUDGE POND COST ADJUSTMENT COEFFICIENTS
101. *
102. CEE : 100000. 120000. 100000. 0.1 0.18 0.0 0.15
103. ALIGN2 : 71059382
104. *
105. *END OF FILE
106. *

```

? J

6.4 JCL FILE

```

1.      //JOBNAME JOB
3.      //STEP1 EXEC PL1LFCLG,PARM.PL1L=CHAR48
4.      //PL1L.SYSIN DD *
5.      /* PROCEDURE TO TRIM DATA FILE                                */
6.      TRIM: PROCEDURE OPTIONS(MAIN);
7.          DECLARE INLINE CHAR(80);
8.          ON ENDFILE(SYSIN) BEGIN;
9.              PUT EDIT (' END OF DATA')(SKIP,A);
10.             STOP;
11.             END;
12.             OPEN FILE(SYSOUT) OUTPUT STREAM LINESIZE(80),
12.1             FILE(SYSPRINT) PRINT LINESIZE(131);
12.2             PUT EDIT ('**BEGIN DUMP')(SKIP,A);
13.             GETIT: DO I=1 TO 2000; /* MAXIMUM NUMBER OF RECORDS */
14.                 GET EDIT (INLINE)(SKIP,A(80));
15.                 IF SUBSTR(INLINE,1,1) NE '*' & SUBSTR(INLINE,10,1) = ':' THEN
16.                     PUT FILE(SYSOUT) EDIT (SUBSTR(INLINE,11))(SKIP,A);
17.                 IF SUBSTR(INLINE,1,1) NE '*' & SUBSTR(INLINE,10,1) NE ':' THEN
18.                     PUT FILE(SYSOUT) EDIT (INLINE)(SKIP,A);
19.             /* PUT EDIT(INLINE)(SKIP,A); */
20.             END GETIT;
21.             END TRIM;
22.             //GO.SYSIN DD DSN=FGDAT01,DISP=SHR
24.             //GO.SYSOUT DD DISP=(NEW,PASS),SPACE=(3120,(20,20)),
25.             // UNIT=SYSDA,DCB=(RECFM=FBS,LRECL=80,BLKSIZE=3120)
26.             //STEP2 EXEC PL1LFCLG,PARM.PL1L='CHAR48,OPT=2'
27.             //PL1L.SYSIN DD DSN=TEST7,DISP=SHR
28.             //LKED.SYSLMOD DD DSN=%%GOSET(WENT),DISP=(MOD,PASS),
29.             // UNIT=SYSDA,SPACE=(1024,(50,20,1),RLSE)
30.             //GO.SYSIN DD DSN=*.STEP1.GO.SYSOUT,DISP=(OLD,DELETE)
30.1            //GO.SYSOUT DD SYSOUT=A
31.            //GO.FLCC DD *
32.            *
33.            *
34.            *
35.            RUNNAME :RUNXXXX:5/12/81
36.            SWITCH :01000100000000000000
37.            ENABLE :1111111
37.1           MULT :1.0
37.2           CVAR :0
38.            ALIGN1 :13579
38.01          /*
38.1           //GO.OUTPUT DD DSN=OUTPUT,DISP=OLD,
38.2           // UNIT=SYSDA,SPACE=(1600,(20,10)),
38.3           // DCR=(LRECL=80,BLKSIZE=1600,RECFM=FB)
39.           //STEP3 EXEC PL1LFCLG,PARM.PL1L=CHAR48
40.           //PL1L.SYSIN DD DSN=TABLE4,DISP=SHR
41.           //LKED.SYSLMOD DD DSN=%%GOSET(GONE),DISP=(MOD,PASS),
42.           // UNIT=SYSDA,SPACE=(1024,(50,20,1),RLSE)
43.           //GO.SYSIN DD DSN=*.STEP2.GO.OUTPUT,DISP=SHR
44.           //

```