TABLE A.4.2
Comparison of Cost of Abating SO_2 by Various Options[1]

Control Options	Off-gas SCFM	Off-gas % SO_2	Off-gas SO_2 tonnes per day	Capital Cost 10^6 $	Operating Cost 10^6 $	Amortization 10^6 $	Total Annual Cost 10^6 $	Cost Per tonne SO_2 removed $[2]
Single contact acid plant on strong gas stream[3]								
- continuous gas only	27 000	12	346	17	1.5	2.5	4.0	33
- variable gas only	49 000	5-8	346	28	2.2	4.1	6.3	52
- continous gas & variable gas	36 000	6-12	346	22	1.8	3.1	4.9	40
Non-regenerative scrubbing of weak gas stream[4]								
- lime	400 000	1	430	40	17.4	5.7	23.1	154
- limestone	400 000	1	430	47	13.4	6.8	20.2	134
Regenerative scrubbing of weak gas stream[4]								
- MgO and acid plant	400 000	1	430	65	10.9	9.3	20.2	134
- Citrate and acid plant	400 000	1	430	58	7.9	8.3	16.2	108
Replacement of process producing weak gas stream with modern process[5]								
- existing old smelter process (uncontrolled)				--	26.0[6]	---	26.0	---
- modern process	63 000	8	540	215	22.0[6]	30.9	52.9	115[7]

1. All costs are in 1981 U.S. dollars. Capital costs is amortized over 12.5 years at 10% interest.
2. Production is based on 350 operating days per year and assuming 100% control of SO_2.
3. Figures are derived from "A Study of Sulfur Containment Technology in the Non-ferrous Metallurgical Industry", Economic and Technical Review Report EPS-3-AP-79-8, Air Pollution Control Directorate, Environment Canada, April 1980.
4. Non-regenerative and regenerative scrubbing of weak gas cost estimates are taken from the EPA data presented in the Appendices. The cost estimates for the regenerative scrubbing of weak gas stream also include a capital cost of $20 million and an annual operating cost of $6.8 million for a 660 tonnes per day sulfuric acid plant.
5. The cost estimates are for a copper smelter producing 100 000 tonnes per annum of copper. Modern processes are processes such as the INCO, Noranda and Mitsubishi processes.
6. The annual operating cost of a fully depreciated, existing reverb based smelter with no SO_2 controls is estimated to be about $26 million. The operating cost of the modern processes is approximated at $22 million.
7. The difference between the annual operating cost for the facility and the old facility are allocated to SO_2 control. The cost per tonne SO_2 fixed is computed assuming 100% SO_2 capture.