

TABLE A.4.2
Comparison of Cost of Abating SO₂ by Various Options⁽¹⁾

Control Options	Off-gas			Capital Cost 10 ⁶ \$	Operating Cost 10 ⁶ \$	Amortization 10 ⁶ \$	Total Annual Cost 10 ⁶ \$	Cost Per tonne SO ₂ ⁽²⁾ removed \$
	SCFM	% SO ₂	SO ₂ tonnes per day					
<u>Single contact acid plant on strong gas stream⁽³⁾</u>								
- 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
- continuous gas & variable gas	36 000	6-12	346	22	1.8	3.1	4.9	40
<u>Non-regenerative scrubbing of weak gas stream⁽⁴⁾</u>								
- 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
<u>Regenerative scrubbing of weak gas stream⁽⁴⁾</u>								
- 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
<u>Replacement of process producing weak gas stream with modern process⁽⁵⁾</u>								
- 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⁾

- All costs are in 1981 U.S. dollars. Capital costs is amortized over 12.5 years at 10% interest.
- Production is based on 350 operating days per year and assuming 100% control of SO₂.
- 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.
- 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.
- 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.
- The annual operating cost of a fully depreciated, existing reverberatory based smelter with no SO₂ controls is estimated to be about \$26 million. The operating cost of the modern processes is approximated at \$22 million.
- The difference between the annual operating cost for the facility and the old facility are allocated to SO₂ control. The cost per tonne SO₂ fixed is computed assuming 100% SO₂ capture.