

XI. LAND RECLAMATION SUMMARY

Any report on studies of the terrestrial environment of the Sudbury area would not be complete without some reference to the land reclamation activities that have taken place in recent years. Following the improvement in the local air quality, as already described in this report, it became possible to re-establish a vegetation cover on previously damaged sites. The following synopsis was taken from a summary report of the land reclamation program prepared by the Regional Municipality of Sudbury (25).

Large scale land reclamation in the Sudbury area began in 1978 using technology developed by Laurentian University and by Inco Ltd. The project was carried out under the guidance of the Vegetation Enhancement Technical Advisory Committee (VETAC) of the Regional Municipality of Sudbury. The VETAC group consists of volunteer members representing Laurentian University, the Regional Municipality, Inco Ltd., Falconbridge Ltd., Ontario Ministry of Natural Resources, Nickel District Conservation Authority, Ontario Ministry of Northern Affairs, Sudbury Horticultural Society, area Municipalities and the Ontario Ministry of the Environment.

Land reclamation activities have been carried out each year since 1978. Funding was derived from a variety of sources to employ students and unemployed or laid off workers for nearly 39,000 work weeks over a period of six years. Total cost of the program 1978 to 1983 amounted to about \$12 million.

The reclamation involved mainly the application of agricultural limestone to areas which had previously shown environmental disturbance and loss of vegetation due to historical, mining-related activities. The limestone was used to neutralize soil acidity and render the metals in the soil less toxic to vegetation. The liming activity was followed by application of fertilizer and a grass seed mixture. A number of smaller projects to monitor the success of the work, to carry out experimental work and to document the project activities were associated with the overall program (Table 62).

To say the least, the reclamation work has been highly successful in establishing a vegetation cover on over 2,600 ha of treated areas. It has been noted that natural establishment by native trembling aspen and seedlings of other tree species is taking place. This growth has been supplemented with over 850,000 nursery grown trees. The reclamation program has been successful in improving the visual appearance of the Sudbury area as well as providing temporary employment and increasing the civic pride of the citizens in the area.

XIII. ACKNOWLEDGEMENTS

The authors wish to express their thanks to Mr. R. Potvin, Chief, Air Quality Assessment, and Mr. J. Fry, Manager, Technical Support Section, for supervision, advice and support; to staff of the Toronto Laboratory (Mr. P. Vijan, Mr. R. Harris, Mr. R. Wills) for chemical analysis of vegetation and soil samples; to Mr. K. Waldie and staff (Mr. D. Neve and Mr. W. Tremblay) for maintenance of the air quality monitoring equipment; to Mrs. A. Diotte, Mrs. C. Gingras, Mrs. S. Langin, Ms M. Lacroix, Mrs. V. Lee, Ms N. Berthiaume and Ms A.J. Brightman for word processing assistance; and to many seasonal assistants over the years who helped to collect and process the samples. As a result of the coordinated efforts of all these people, the presentation of this report was made possible.

XII. BIBLIOGRAPHY

1. Anonymous, 1978. Report on particulate deposition in Sudbury, August 30, 1978, and September 8, 1978. Ontario Ministry of the Environment, Northeastern Region, Sudbury, Ontario.
2. Beaton, J. D., 1966. Sulphur requirements of cereals, tree fruits, vegetables and other crops. *Soil Sci.* 101(4):267-282.
3. Beckett, P. H. T. and R. D. Davis, 1978. The additivity of the toxic effects of Cu, Ni and Zn in young barley. *New Phytol.* 81, 155-173.
4. Costescu, L. M. and T. C. Hutchinson, 1972. Ecological consequences of soil pollution by metallic dust from the Sudbury smelters. Proc. 18th Annual Technical Meeting of the Institute of Environmental Sciences, New York, May 1-4, 1972. pp. 540-545.
5. Cox, G. L., 1975. The effects of smelter emissions on the soils of the Sudbury area. M.Sc. Thesis, University of Guelph, Guelph, Ontario. 236 pp.
6. Davis, R. D., P. H. T. Beckett, and E. Wollan, 1978. Critical levels of twenty potentially toxic elements in young spring barley. *Plant and Soil* 49: 395-408.
7. Dreisinger, B. R., 1964. Sulphur dioxide levels in the Sudbury area and some effects of the gas on vegetation in 1963. Ontario Department of Mines, Sudbury, Ontario. 33 pp.
8. Dreisinger, B. R., 1970. Monitoring atmospheric sulphur dioxide and correlating its effects on crops and forests in the Sudbury area. In Proc. Conference on Impact of Air Pollution on Vegetation, Toronto. 23 pp.
9. Gorham, E., 1960. Some effects of smelter pollution northeast of Falconbridge, Ontario. *Can. J. Bot.* 38: 307-312.
10. Keller W. and J. R. Pitblado, 1986. Water quality changes in Sudbury area lakes: A comparison of synoptic surveys in 1974-1976 and 1981-83. *Water, Air, and Soil Pollution* 29: 285-296.
11. LeBlanc, F., 1972. The epiphytic vegetation of Populus balsamifera and its significance as an air pollution indicator in Sudbury, Ontario. *Can. J. Bot.* 50: 519-528.

12. Linzon, S. N., 1958. The Influence of Smelter Fumes on the Growth of White Pine in the Sudbury Region. Joint Publ., Ontario Dept. Lands and Forests, Ontario Dept. Mines, Toronto. 45 pp.
13. Linzon, S. N., 1971. Economic effects of sulphur dioxide on forest growth. J. Air Pollut. Control Assoc. 21:81-86.
14. Linzon, S. N., R. G. Pearson, J. A. Donnan and F. N. Durham, 1984. Ozone Effects on Crops in Ontario and Related Monetary Values. Ontario Ministry of the Environment, Toronto, ARB-13-84-Phyto. 60 pp.
15. McIlveen, W. D. and D. Balsillie, 1978. Air Quality Assessment Studies in the Sudbury Area - Volume 2. Effects of Sulphur Dioxide and Heavy Metals on Vegetation and Soil (1970-1977). Ontario Ministry of the Environment, Northeastern Region, Sudbury, Ontario. 105 pp.
16. McIlveen, W. D. and J. J. Negusanti, 1984. Marginal Chlorosis of White Birch in the Sudbury Area, 1978-1983. Progress Report No. 1. Ontario Ministry of the Environment, Northeastern Region, Sudbury. 70 pp.
17. McIlveen, W. D. and J. J. Negusanti, 1984. Report on the Investigation of Air Contaminant Injury to Vegetation at Rayside, Ontario, Conducted on August 8, 1984. Ontario Ministry of the Environment, Northeastern Region, Sudbury. 20 pp.
18. McGovern, P. C. and D., Balsillie, 1973. Sulphur Dioxide (1972) - Heavy Metal (1971) Levels and Vegetation Effects in the Sudbury Area. Air Management Branch, Ontario Ministry of the Environment, Sudbury, Ontario. 50 pp.
19. McGovern, P. C. and D., Balsillie, 1975. Effects of Sulphur Dioxide and Heavy Metals on Vegetation in the Sudbury Area (1974). Ontario Ministry of the Environment, Northeastern Region, Sudbury, Ontario. 33 pp.
20. Ontario Ministry of the Environment, 1983. Field Investigation Manual. Toronto.
21. Potvin, R. R. and D. Balsillie, 1976. Air Quality Monitoring Report for the Sudbury Area 1975. Ontario Ministry of the Environment, Northeastern Region, Sudbury, Ontario. 88 pp.

22. Potvin, R. R. and D. Balsillie, 1978. Air Quality Assessment Studies in the Sudbury Area - Volume 1. Air Quality Monitoring for the Sudbury Area (1976-1977). Ontario Ministry of the Environment, Northeastern Region, Sudbury, Ontario. 23 pp.
23. Spires, A. and W. D. McIlveen, 1985. Investigation of Metal Toxicity to Grass in the Copper Cliff Area, 1982-1984. Ontario Ministry of the Environment, Sudbury, NER-AQTM-31-85. 20 pp.
24. Tebbins, B. D. and D. H. Hutchinson, 1961. Application of air quality standards to a community problem. Journal of the Air Pollution Control Association. 11: 53-56.
25. Vegetation Enhancement Technical Advisors Committee, 1985. Land Reclamation Program, Regional Municipality of Sudbury, 1978-1983, Regional Municipality of Sudbury. 65 pp.
26. Ontario Ministry of the Environment, 1982. Sudbury Environmental Study Synopsis, 1973-1980. Ontario Ministry of the Environment Acidic Precipitation in Ontario Study Coordination Office, Toronto. 119 pp.
27. Ozvacic, V., 1982. Emissions of Sulphur Oxides, Particulates and Trace Elements in the Sudbury Basin. Air Resources Branch, Report No. ARB-ERTD-09-82. 69 pp.
28. Ozvacic, V. and J. McDonald, 1982. Sulphur Dioxide, Sulfuric Acid, Particulate and Particle Size Determinations at Falconbridge Smelter Stack, August, 1979. Air Resources Branch Report No. ARB-TOA40-80. pp. 49.