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A STUDY OF PHOTOCHEMICAL AIR POLLUTANTS IN THE URBAN  
AIRSHEDS OF EDMONTON AND CALGARY

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This study was commissioned by the Alberta Department of the Environment in 1974 and its objectives were:

1. To examine carefully the existing air pollutant data base for airsheds of Edmonton and Calgary;
2. To test the steady-state mechanism for the production of ozone through photochemical means by employing ambient air pollutant data available for extremes of meteorological conditions prevalent in Edmonton and Calgary;
3. To make available a report of the findings which will include a set of recommendations.

Meteorological and air pollutant data for the months of July and December 1974, monitored by different agencies for the two airsheds, were employed in carrying out the final analysis.

The final report was made public during December 1975. It was concluded that ozone was generated through photochemical reactions of air pollutants present in the urban airsheds of Edmonton and Calgary. Precise amounts of ozone produced could not be determined because of the lack of background ozone levels. Oxidant/ozone concentrations would stay below the provincial standard of 50 parts per billion in winter months because of frequent temperature inversions and relatively high concentration of nitric oxide in the airsheds. During summer months, oxidant/ozone concentrations above the Alberta standard would occur occasionally on sunny days. It was recommended that:

1. a short description of the strong and weak points of the present monitoring sites should be made available because many persons expressed interest concerning the criteria which were considered in establishing monitoring station sites;
2. monitoring instrument replacements and/or changes should be well documented in the pollution summary reports;
3. new instruments should be run alongside those already in operation for a minimum period of two weeks or longer prior to putting the new instruments into full operation;
4. calibration of the instruments should be checked regularly;

5. a better instrument should be used for monitoring both particulate matter and aerosols;
6. a study should be undertaken to determine Alberta background ozone levels as well as of all other air pollutants;
7. at least one monitor of solar intensity should be operated continuously for a minimum of three years in each of the two cities;
8. Alberta Department of the Environment should take steps to obtain carefully monitored data on ozone/oxidants from Edmonton Power in addition to data on oxides of nitrogen because of the importance of ozone in the city airsheds;
9. the mobile monitoring unit should be employed to measure air pollutants in the river valley in Edmonton;
10. the release of the Air Quality Index in the present form and its representativeness of city air quality should be examined critically;
11. a simple photochemical reaction scheme should be incorporated into the existing urban airshed models for the two cities;
12. environmental research relating to ozone-green plant interactions, in the presence and absence of sulphur dioxide, should be promoted;
13. field and laboratory investigations related to major air pollutant chemical transformations at sub-zero temperatures should be promoted;
14. short term micrometeorological studies related to urban airsheds should be promoted;
15. monitoring of *PAN* (peroxyacetyl nitrate) and *PPN* (peroxypropionyl nitrate) should be carried out prior to establishing a standard for hydrocarbons.

Most of these recommendations have already been adopted by the Alberta Department of the Environment. Technical papers from this study will be submitted for publication.