

PRESENTED AT THE FOURTH
REUNION D'INFORMATION
HYDRO QUEBEC

1971

The Development and Current
Status of Right-of-Way Management in
Ontario Hydro

M.R. Gardner 1/

Résumé

On donne un aperçu des origines de la Commission d'Énergie hydroélectrique de l'Ontario et de son évolution jusqu'à ce jour. Puis on décrit le développement du réseau et la demande croissante d'une alimentation assurée qu'il provoque. La création, au sein de la Commission, d'un département forestier responsable de l'entretien des emprises, est expliquée du point de vue de son histoire et de ses fonctions. Les techniques employées actuellement dans le cadre du vaste programme provincial sont traitées, ainsi que les développements les plus récents. Pour conclure, on étudie les tendances futures relatives à l'entretien des emprises, en tenant compte des nouvelles méthodes et de l'attention qu'il faut porter à la protection de l'environnement.

1/ M.R. Gardner - Assistant District Forester - Vegetation Control, Head Office Forestry Department. Hydro-Electric Power Commission of Ontario.

The Development and Current
Status of Right-of-Way Management in
Ontario Hydro

M.R. Gardner 1/

ABSTRACT

The origin of Ontario Hydro and its development to the present day is reviewed. The expansion of the power system and concomitant pressure for a dependable supply of electricity is followed. The formation of the Forestry Department as an integral part of the Commission and the responsibility of this department for right-of-way management is explained both historically and functionally. Present techniques used in the extensive Provincial program are given with a review of the most up-to-date developments. Future trends in the efficient management of rights-of-way in the light of new methods and environmental concerns are examined.

HISTORY

The first electricity in Ontario generated from a power plant, was produced by the Cataract Power Company of Hamilton in 1898. This hydraulic station at DeCew Falls near St. Catharines developed current at 66 2/3 cycles not, as we would imagine, for only Ontario but for northern New York State, for there was very little use of electricity by Canadians seventy years ago and none that involved transmission over any great distance. This is not too surprising for even then electricity was not without its detractors. Barely 17 years before, the eminent engineer-in-chief of the British Post office Sir William Preece, had soundly declared that "Subdivision of the electric light is an absolute ignes fatuus". How wrong Sir William was to be can be measured by the phenomenal growth of our Commission since its inception.

We developed first slowly, yet soon gathering momentum and by 1906 public sentiment had been aroused sufficiently for the Ontario Legislature to pass an "Act to Provide for the Transmission of Electric Power to the Municipalities". The following year saw the creation of the present Utility as a public enterprise under the Power Commission Act.

1/ M.R. Gardner
Assistant District Forester - Vegetation Control
Head Office Forestry Department
Hydro Electric Power Commission of Ontario

In 1910 a ceremony in the City of Berlin, a name which fell into disfavour and now better known as Kitchener, brought about the "Illumination of the Streets and Buildings by Electricity" - electricity produced and purchased in Niagara Falls ninety miles away and transmitted on a one hundred and ten thousand volt line. A humble start to the first of many transmission lines and of course, rights-of-way that would eventually form a grid throughout the Province.

The delivery of the first power to Berlin was soon followed by the clamour of other municipalities who wished to avail themselves of similar benefits. Hamilton and Toronto had hydro by 1911 and by early 1912 the demand for electricity had quadrupled; and with the power came transmission lines and with the lines and poles came rights-of-way.

The then leading proponent of public power, Adam Beck, later to be knighted for his long Chairmanship of the Commission, had a bitter struggle in those infant years of the utility against enemies of public ownership. The measure of his success can be gauged by the fact that in a scant twenty years Ontario Hydro became the largest publicly owned utility in the world - and it had only just begun to grow.

By 1928 Ontario Hydro was operating not only through the municipalities, but about 3,800 miles of lines in 122 rural power district serving more than 31,000 customers. Contrary to the assertions of those who could not foresee the growth of the power system, expansion and better service became pressing needs - and with expansion came problems. Interruptions caused by trees were frequent; a frequency which neither the customers would tolerate nor the Commission reduce without a concerted effort. So, in 1930 a Forestry Department was organized with a field staff of 22 men. A policy of thorough line clearing was implemented, which included in addition to securing good clearance for the conductors, the removal of deadwood overhanging lines, cutting of stubs left from previous tree work, making flush cuts and painting wounds with asphalt dressings, shaping the trees and finally the cutting of all underbrush and the removal of hazardous weed trees. This work was confined, however, to transmission and rural distribution lines along the Kings Highway.

Seventeen years were to elapse before drastic change was to take place in this sequence. However, drastic change had faced the world in six terrible years of war. During these years a heavy backlog of work had accumulated and when the servicemen returned from active duty to their prewar jobs, the staff was still too small to catch up with it. To complicate this situation there was soon a dramatic upswing in population followed by rapid industrial expansion. This resulted in increased line mileage which went hand in hand with more trees and more brush to control. Thus, the problem became further compounded. Up until now the method of dealing with brush on rights-of-way had been those familiar hand tools, the axe and the saw - a laborious and expensive method indeed as we shall note further on. Under such conditions an increase in staff was inevitable. Such was the demand for power the Commission found that it could no longer operate efficiently from one location in Toronto. Thus complete decentralization of administration was brought about through reorganization of the Commission into Regions

and Areas in 1947. Yet the Forestry Department was to find that this was a mixed blessing for it was now responsible for clearing all rural distribution as well as transmission lines; right-of-way vegetation control became then, another major item in an already sizeable workload. The department now had 114 tradesmen divided amongst the operating areas which were small wholly contained units in each of nine major regions of the Province.

Advances in agriculture research were, however, to come to the aid of the beleaguered men whose early battle with woody brush had been conducted so strenuously with those primitive hand tools. The early plant physiologists, Went, Kogl and Thimann had laid the foundation for the study of plant hormones not only as they could effect plant growth responses but for their use as selective weed control substances. It was left for Slade, Nutman, Hamner and Tukey to discover the potential of the synthetic auxins, 2, 4, -Dichlorophenoxyacetic acid and 2, 4, 5, -Trichlorophenoxyacetic as selective herbicides. These compounds were to play a large part in our management of rights-of-way over the next two decades. Not only did they make it possible to catch up to the hydra like problem of controlling woody brush but they offered a method now calculated as six times less costly than the axe and the saw.

CURRENT MANAGEMENT

From the beginnings described in the initial part of this paper and spray programs of some 100 acres in 1949 we have developed a large integrated yet diversified management program for our rights-of-way and associated property. The population of Ontario has grown from a few hundred thousand to our present day 7,000,000. To serve the electrical needs of these people Ontario Hydro maintains 20,000 miles of transmission lines and some 50,000 miles of distribution lines. Associated with this system are some 200,000 acres of rights-of-way where brush control programs must be practiced to maintain a dependable supply of electrical energy. The full scope of this undertaking can be shown by examining our annual work programs. Approximately 40,000 acres of brush are treated by our Forestry crews each year while in addition, over 5,000 acres of turf are mown and sprayed for weed control. Moreover, 750,000 of the estimated 3,000,000 trees in close proximity to our conductors are either pruned or removed in the course of one season. Further, soil sterilization is conducted on the stoned areas in close proximity to our transformer stations.

Such an undertaking cannot be attempted without considerable resources of both men and equipment. The intrepid twenty-two originals would not recognize the present work force now numbering close to five hundred, ranging from professional foresters in a resource capacity at our head office to the journeyman in the field with a \$25,000 trim lift or \$18,000 articulated sprayer.

The power saws, chipping machines, aerial ladders, aerial bucket devices, articulated tractors, hydraulic tools and helicopters, all a product of our advancing technology, would seem as foreign to them as would the household appliances which greedily consume the electricity that we work so hard to supply.

To accommodate the constant changes in the technology of work equipment and thus work methods, Hydro has always endorsed the philosophy of training staff - this with the understanding that it is the only way to make best use of the human abilities which are essential for the development of a good tradesman.

Training has enabled us to efficiently co-ordinate men, methods and machines to achieve the best volume of high quality work at the lowest possible cost. The result is a responsive, responsible utility arborist who works safely and efficiently, a man who is respected in his community. His training will have consisted of four general courses, timed to coincide with his progression through the trade. These will normally occur in the first four years of employment and will be followed by periodic updating courses. He will have been exposed to the theory and practice of forestry, mechanical equipment, safety, and interpersonal communication. These are skills which enable him to deal with the problems that arise in the constantly changing scope of our operations.

Before examining the more important changes that are presently taking place, let us view our staple right-of-way management programs in greater depth. As previously stated the major bulk of our program is the chemical control of woody brush and noxious weeds. Three main techniques are used in our program. Stem foliage accounts for 60 per cent of the work, while basal spraying in sensitive crop production areas and aerial application with Commission owned helicopters account for 30 per cent and 10 per cent respectively. The choice of the best technique will depend on such factors as brush species, accessibility of the right-of-way, availability of equipment, safety and current legislation. The herbicide chosen for the job will be the one that will safely give the desired results at the lowest cost per acre per year before retreatment is required. The herbicides used in our operations are similar to those utilized by most companies involved in extensive brush management. Combination of 2, 4-D and 2,4,5-T are used for weed and deciduous brush control. TCA is used to control conifers, and in areas where deciduous and coniferous species grow in close proximity, it is used in combination with 2,4,5-T. Tordon 101 is effective on most woody species, and is used mainly in Northern Ontario. Since it takes longer to break down in soil than the other herbicides, we do not use it in agricultural areas. Amitrol is used to eradicate poison-ivy. The rates of application are based on the label recommendations approved by the Federal Department of Agriculture, the recommendations of the Ontario Herbicide Committee and the results of our own research. The concentrations used are often well under the label recommendations, and in all cases never exceed them.

All personnel involved in chemical spraying are trained in pesticide use, both by a qualified supervisor and at our Conference and Development Centre. A three-week course covers, amongst other things, the properties of the herbicides, the concentrations to use, the mixing and application, the prevention of drift and other precautionary

measures. The tradesmen are each supplied with a book of specifications and instructions and are supervised by men with practical field experience, licenced by the Ontario Department of Health under the regulations of the Provincial Pesticides Act.

Despite the effectiveness of our instituted programs an effort has been made to keep abreast of new developments. Complacency has no place in an efficient right-of-way management plan for there are always new chemicals, tools, equipment and philosophies which can be applied to contain nature's relentless laws of plant growth and succession. Many of the recent developments have been a natural progression of our past experiences while some are related to the current climate of environmental concern. We are in some measure trying to anticipate what modifications and innovations should be made to de facto concepts before public pressure or legislature action unwittingly or deliberately restricts the spectrum of alternatives.

Here then are some of the more recent developments for right-of-way management in Ontario. The scheduling of re-treatment time is being investigated. The proper timing of resprays is probably the most important single factor in keeping right-of-way maintenance costs at a minimum. Time and work studies should show the relationship between the factors of line reliability, terrain, brush species and density and availability of men, equipment and techniques. These relationships will provide a basis for determining the ideal time to spray for the least cost per acre per year.

Selective spraying has been introduced where feasible on existing rights-of-way. Species which pose no problems with regard to access, fire hazard or contact with conductors, and equipment will not be treated.

To overcome the problem of misplacement of aerially applied herbicides, two new developments are of particular interest. For tower lines where the maximum tower height would be no greater than 100 ft., a non thickened spray is applied with an Amchem microfoil boom. An even sheet of liquid is formed by spray droplets released from needle like orificies. Where the tower height exceeds 100 ft. it is intended to use pelletized herbicides applied with a helicopter slung centrifugal spinner. Three materials have been examined at three rates and evaluation has indicated that picloram pellets applied at 35 lb. to the acre is the optimum chemical and rate. The full right-of-way will not be treated, but rather a 15 ft. buffer strip will be left on each side to minimize the possibility of damage to trees whose roots extend into the treated area.

Biological control of brush is also under examination. To provide competition to seedlings of undesirable species, various smother crops were grown in trial plots last year. Nine species of grasses and legumes were formulated into five mixtures. A total of one hundred and fifty test plots were sown under various field conditions. Statistical evaluation of the experiment would indicate that a mixture of Climax Timothy and Birdsfoot Trefoil will be the best suited for future use. The reduction of erosion and the provision of ground cover for wildlife will be ancillary benefits to this development.

It is the view of many conservationists that electric power lines are one of the most significant despoilers of natural beauty wrought by the industrial revolution. Whether this view is right or wrong, much of the general public shares it, and the electric utilities are now under constant pressure to reduce the impact of transmission lines on the surrounding landscape. A policy has now been adopted for new rights-of-way in Southern Ontario. Where in the past the power corridor has been completely cleared, the new concept includes the use of selective cutting, screening, and other landscape techniques where appropriate to assure that the rights-of-way blend into the surrounding countryside as much as possible. Existing rights-of-way will be examined in a similar light and modifications made to road crossings wherever possible.

A field which is only now starting to be explored is a further extension of the work by the early plant physiologists. The hormone type chemicals encompass more than just the group of phenoxy herbicides. Synthetic auxins which will control the growth of plants or suppress the formation of adventitious buds are now available. A considerable amount of research has been conducted by our utility into these chemicals and a number of technical papers published. A specification for a fortified tree wound dressing is presently being formulated for tree trimming operations, while experiments are being reviewed on the foliar application to coniferous and deciduous trees which will remain on the newly cut rights-of-way. As has been noted in a previous section, some 5,000 acres of grass are mown each year, many requiring such maintenance three to six times each season. The growth regulating chemicals offer considerable potential for the reduction of maintenance costs for grass if their application can effectively reduce the number of mowings required. A tentative recommendation for the use of MH30 has resulted from extensive examination of the available compounds.

On stoned areas maintained as such to reduce the potential fire hazard around transformer units, soil sterilants have been the most effective method of controlling unwanted vegetation. Recent experiments have indicated that no single compound is suitable for this application. Eight materials were evaluated at different application times both singularly and in mixtures at various rates on different soil types. Evaluation has shown that spring application is more effective than autumn application while Diuron is best on light soils and the trazines are best on heavy soils.

Lastly, mention should be made of our co-operation with the University of Guelph, the Ontario Department of Agriculture's Pesticide Residue Laboratory and the Ontario Water Resources Commission. An ecology study has been initiated to study exactly what vegetative changes occur when herbicides are used to control undesirable growth. The major cause for initiating such a study was the lack of any unbiased, scientifically, accurate data on such effects after both aerial and ground applications of the newer herbicides.

FUTURE HORIZONS

It is near impossible to predict the future at least with any accuracy, and all attempts to do so in any detail appear ludicrous in a very few years. It has been observed for instance that of the children born today, 30 per cent will be employed in jobs yet to be thought of. This prospect cannot be very comforting to those whose responsibility it is to project the needs of an electric utility in the future.

We know, however, that our generation capacity is required to double approximately every seven years. From this basic tenant we may extrapolate certain facts. Our requirement for new property for rights-of-way and station development will surpass all that we have accumulated to the present. For rights-of-way alone, it is estimated that the utility companies in North America will require in excess of 3,000,000 acres over the next twenty years. The problems associated with these colossal needs of our industry when there are already severe constraints on land use in urban areas, will demand completely new concepts and new technology if we are not to be overwhelmed by the clamour of critics, politicians and our own consciences.

What then are the outlines of change as it will effect the future of right-of-way management. More intensive land use will require that rights-of-way become an integral part of regional planning. Multiple land use then will, depending on its nature, reduce or increase the need for utility land management. If the responsibility for supervising these areas can be safely turned over to other users, the utility will benefit. If this cannot be the case, the cost of maintenance will rise sharply. New equipment, chemicals and methods will undoubtedly require development - the success of this development will predicate the cost.

Concern with the environment will extend not only to its intelligent use but to its appearance. Aesthetics will command an increasing segment of the right-of-way and station maintenance budget. The onus to develop, not to resist, such trends will rest with all responsible utilities and their employees. However, enthusiasm for these developments must be tempered with a realistic ability to implement sensible and orderly change. Objective planning must precede all developments, economics must not be forsaken for pure beauty.

We must be aware of the needs of man and of nature. We must resolve to fulfill the needs of both to the detriment of neither. If we can accomplish this, each of us in our own way will have made a contribution now, for a future which must recognize the equality of all beings.

Selected Literature References

- _____, 1968, Working Committee in Utilities. Report to the Vice President and to the Presidents' Council on Recreation and Natural Beauty. Superintendent of Documents, Washington.
- _____, 1960, Forestry In Hydro. Description of the Forestry function. Internal information sheets. Hydro Electric Power Commission of Ontario.
- _____, 1971, Policy and Procedures for clearing of New Transmission Line Rights-of-Way in Southern Ontario. Task Group Environmental Co-ordinating Committee - Amenities. Hydro Electric Power Commission of Ontario.
- Audus, L.J., 1964, (Editor) The Physiology and Biochemistry of Herbicides. Academic Press. R.C. Brian p 13-14.
- Corin, F., 1965, Evolution and Revolution in Forestry. Paper presented at Forestry Foremen's Conference. Hydro Electric Power Commission of Ontario.
- Corin, F., 1967, History of the Forestry Department. Internal Forestry Department Report. Hydro Electric Power Commission of Ontario.
- Clarke, A.C., 1971, Profiles of the Future. Bantam Science and Mathematics Series p 3.
- Gardner, M.R., 1970, A Study in the Control of Sucker Growth on Utility Pruned Trees. Proc. International Shade Tree Conference, Vol 46 (in press).
- Gardner, M.R., 1970, A comparative Study of Four Growth Retardants Applied as Foliar Sprays. Proc. Northeastern Weed Science Society, Vol 25, pp 332-344.
- Gardner, M.R., 1971, Growth Control in Plants - Evolution of, and Research Requirements for the Application of Growth Regulators in Plant Management. Invitation Paper presented at Symposium on Growth Regulators. Dow Chemical Company, Midland, U.S.A.
- Gillespie, E.D., 1971, Ontario Smother Crop Trials. Paper presented at a Symposium on Crown Vetch, University of Guelph, Ontario.
- Gillespie, E.D., 1971, Functions of the Forest Management Section - Forestry Department - Systems Maintenance Division. Internal Forestry Department Report. Hydro Electric Power Commission of Ontario.
- Hunter, G., 1969, Forestry Department 1969 Annual Report. Internal Commission Report. Hydro Electric Power Commission of Ontario.

- Hunter, G., 1969, Activity Report Forestry Department presented at Operating Engineers Meeting. Internal Commission Report. Hydro Electric Power Commission of Ontario.
- Hunter, G., 1970, Forestry Department 1970 Annual Report. Internal Commission Report. Hydro Electric Power Commission of Ontario.
- Hunter, G., 1970, Activity Report Forestry Department presented at Operating Engineers Meeting. Internal Commission Report. Hydro Electric Power Commission of Ontario.
- Jenkins, W., 1970, Training in Forestry Work. Proc. International Shade Tree Conference #46 (in press).
- Jenkins, W., 1971, Line Clearing - Trees and Men. Proc. Ontario Shade Tree Council Meeting, March 1971.
- Johnson, J.T., 1968, Forestry in Hydro - A General Picture. Paper presented at Meeting of Engineers in Training. Manpower and Professional Training Department. Hydro Electric Power Commission of Ontario.
- McPhail, R.A., 1965, Right-of-Way Brush Control. Proc. of Canadian Electrical Association, November 1965. Montreal, Quebec.
- McPhail, R.A., 1969, Equipment for Applying Herbicides to Utility Rights-of-Way in Ontario. Paper presented at Ohio Pesticide Institute Conference, December 1969, Columbus, Ohio.
- McPhail, R.A., 1970, Vegetation Control on Power Line Rights-of-Way in Ontario. Paper presented at Application Course Nova Scotia Agricultural College, April 1970. Truro, Nova Scotia.
- McPhail, R.A., 1970, Prescriptions for Ontario Hydro. Proc. of Weed Science Society of America, 10th Annual Meeting.
- McPhail, R.A., 1971, Current Research in the Vegetation Management Program of a Large Canadian Electrical Utility. Proc. of Weed Science Society of America 11th Annual Meeting.
- Punhani, A.L., 1971, Statistical Analysis of Smother Crop Experiments in 1971 Using a Randomized Block Design. Report #71-103-H. Operations Research Group. Research Division. Hydro Electric Power Commission of Ontario.
- Winter, J.E.F., 1966, Trends in Forestry. Paper presented at the Ontario Hydro Area Managers Conference, March 1966, Toronto, Ontario.