ENERGIZED URBAN FORESTRY[1]

by Gary O. Merrill

Abstract. Murray City Power is a small public utility operated by the community of Murray, Utah. Despite its small size, this utility faces problems and challenges common throughout the industry, particularly related to public relations, tree clearances, and power outages. Murray's holistic approach to managing the entire urban forest, including line clearance trees, has proven successful, both for the community and for the utility. Success is demonstrated through an analysis of outage data.

Résume. Murray City Power est un service d'électricité opéré par la ville de Murray, Utah. En dépit de sa petite taille, ce service rencontre les problèmes et les défis communs aux autres compagnies d'électricité, particuliérement ceux relatifs aux relations publiques, à l'élagage et aux pannes d'électricité. L'approche intégrée de la ville de Murray pour gérer la forêt urbaine, incluant l'élagage à proximité des fils électriques, s'est avérée un succès autant pour la municipalité que pour le service d'électricité. Ce succès est démontré par une analyse des données relatives aux pannes d'électricité.

My objective is to acquaint you with one of the Utility Arborist Association's smaller employers, and with the forestry programs that that employer has undertaken to professionally address its tree-related concerns. In doing so, my goal is to give a view of small scale application of utility and urban forestry practices.

Dick Wells called Philadelphia Electric Company a "small utility", with 2400 square miles of service area, and 2 million customers. Murray City Power is *just* a bit smaller. However, no matter what size the operation, the concerns and problems and needs for solutions are the same.

Murray City is: a) a suburban community of 30,000 residents located in the middle of the Salt Lake Valley, in Utah; b) for the tourists, we are 10 miles south of Salt Lake City; c) for the football fans, we are 40 miles north of Provo and BYU; d) for the skiers, we are 20 miles west of the Snowbird, Alta, and Park City ski resorts.

Murray was incorporated in 1904, and has owned and operated its electric utility, Murray City Power, for over 70 years. As of 8/1/87 Murray City Power: a) has a service area of 9.5 square miles; b) serves 14,168 meters, of which 11,909 (84%) are residential; c) has a peak load in summer, at 54 MW; d) has 120 miles of overhead distribution lines; e) has 10 miles of sub-transmission line, with interconnection with the large investor-owned Utah Power and Light Company for receipt of wheeled power; f) has a power supply from multiple sources, including Federal dams such as Flaming Gorge, shared ownership of coal-fired generation facilities in east central Utah, and fully-owned local, small-capacity hydro and diesel generation plants; g) has a 4% ownership in the recently completed 1600 MW coalfired Intermountain Power Project, although the additional 64 MW this facility would provide Murray is being sold to Los Angeles by lay-off agreements. Murray Power is operated by the City government, and is actually a city department. As such, we interact very closely with other more typical municipal operations. And this is where the forestry programs become interesting!

Murray has had a long-standing concern for trees and beautification. The 10 four-foot diameter silver maples that front our City Hall were planted for Arbor Day in 1922. The City's Shade Tree and Beautification Commission has been continuously active since its establishment in 1960. It was through the tree-advocacy of this Commission that I, *a forester,* was hired in 1976 and given the mandate to improve line clearance practices as well as to develop an urban forestry program for the city. In doing so, we consider the trees in conflict with the utility lines to be a component of our urban forest.

In a small city and utility, the phrase "do more with less" applies. My position with Murray City Power is officially Forestry and Facilities Manager, as head of that Division of the Department. I have supervisory responsibility for the line clearance

[1] Presented to the Utility Arborist Association education session of the annual meeting of the International Society of Arboriculture, August 16-19, 1987, held in Keystone, Colorado. Effective October 1, 1987, Gary Merrill became the Assistant General Manager of Murray City Power.

program, substation and office grounds maintenance, the maintenance of multiple buildings, and the construction of new buildings. In addition, I serve as Murray's City Forester, with the responsibility of supervising street and park tree planting and maintenance, approving all new commercial development landscape plans, and working with the Shade Tree and Beautification Commission on special projects such as Arbor Day observances and beautification award programs. I administer a budget in the City's General Fund that is associated with these non-utility, urban forestry activities in addition to the Forestry/Facilities portion of the Murray Power Fund budget.

The Forestry/Facilities Division currently employs four Arborists and one Lead Arborist, in addition to facilities maintenance and office personnel. This enables us to run two 2-man crews, with the Lead Arborist performing pre-inspections, making public contacts, and serving as a third crew member when needed. These Arborists have all completed a job-required 2-year Apprentice Arborist Training Program, which is anchored by the National Arborist Association's homestudy courses in arboriculture. This training also includes study of select chapters of the Lineman's and Cableman's Handbook, other supplemental readings, and field training in proper arboricultural techniques and safety practices, with and without the association of electrical conductors.

Within Murray's urban forest, there are approximately 10,000 street and park trees, most of which have no line conflicts. Roughly 85% of our distribution system runs along rear property line easements, and we estimate 4-5 thousand trees are growing in locations currently or potentially in conflict with overhead lines. Seventy-five percent of these conflict trees are either Siberian elm, cottonwood, tree of heaven, Russian olive, weeping willow, or silver maple.

We operate on the premise of a 3-year rotation, but take action in any part of the system when exceptional tree growth demands more frequent attention. Our small service area enables the economical accomodation of these out-of-sync needs, although we do try to minimize them through "degree" of pruning or by removal.

The Tree of Knowledge

Information from last year's ISA meeting on the success of injection of growth regulator chemicals has led to the approval of implementation in this fiscal year of an injection program. It is our intent to have all arborists trained, and each crew equipped, to inject every tree we prune for line clearance, within label guidelines. This will be a standard part of our pruning practices on any line clearance job site. Our existing computerized work documentation system will enable us to easily track injected trees to monitor chemical performance.

I have been impressed with the additional information presented on this subject here at Keystone. I can see now that we are going to have to implement trials to determine application rates for our local circumstances, which will set back full implementation of the program by at least 2 years. I also see the opportunity to inject street trees prior to their needing line clearance pruning, or even to inhibit anticipated sidewalk and curb damage by roots if soil injection techniques become approved.

Since 1977 we have utilized modified tree pruning procedures that take into consideration the voltage and type of overhead wire ("open" or covered) when determining how to prune each tree. Our designations include "avenue cut," "sideswipe," "trim under wires and shape," "special cut," and "service line clearance." All procedures involve drop crotch pruning to direct regrowth whenever possible. These same techniques are applied to the maintenance of non-utility trees as well. The Arborists are trained in climbing and rope techniques, but utilize an Aspundh 45-foot bucket-truck with hydraulic tools whenever the tree is "vehicle accessible".

Branching Accomplishments

This change in pruning approach, from the uneducated "flat-topping" so often in the past associated with line clearance, has proven to be a success for the city and the utility.

- The attitude that all of the trees in the city, including line clearance problem trees, are part of an urban forest, and the management and maintenance of that forest by trained arborists, has greatly enhanced public satisfaction with line

clearance and street tree services, and enhanced community pride as well. Our public relations problems that precipitated the hiring of a forester have been virtually eliminated. We average only two refusals per year, and those have always been overcome by direct discussion with the homeowner. With procedural flexibility and the dedication of our arborists to do quality work from first contact to final clean-up, we are now complimented far more than complained about. I am proud to say that Murray has been a TREE CITY USA award recipient from the National Arbor Day Foundation for 10 consecutive years, we won the "National Championship" for Arbor Day programs in small communities in 1983 (also sponsored by the National Arbor Day Foundation), and we have received the Gold Leaf Award from the Rocky Mountain Chapter ISA.

- The value of these changes to the reliability of our electrical system is demonstrated by the significant decrease in the impact of tree-related outages. In the mid to late 70's, virtually every wind, snow, or lightning storm resulted in a multitude of tree-related outages, costing the utility thousands of dollars in overtime wages and lost revenues, and immeasurable damage to public confidence in the reliability of the system. However, as our modified pruning procedures began to be evident throughout the system, the tree-related outages began to decline. In 1985 we began formally tracking all outages by "cause", and this provided the documentation to support our claims of success. Table 1 summarizes the information, demonstrating also the fact that raw data of simply the numbers of each type of outage does not adequately represent the true depth of the impact of outages upon the customers.

In 1985, we did not separately identify "planned" vs. "unplanned" outages. However, in 1986 Murray City Power undertook an extensive program of testing for the presence of PCB's (polychlorinated biphenols) in transformers and other equipment throughout our system, which resulted in significant numbers of planned outages, and a near doubling of the total outages reported in 1986 and in the first half of 1987. As Table 1 demonstrates, the number of "unplanned" outages, (of which "tree-related" outages are a component) remained fairly constant, and was consistent with the pre-PCB testing program year of 1985. Assuming the 395 outages in 1985 were all "unplanned", the percentage of "unplanned" outages that were "tree-related" has also reamined consistently near 10%.

The actual number of outages is not the most useful data for judging impact upon a system. One storm can cause a major outage for many hours, affecting thousands of customers for that length of time. Fifty "tree-relates" outages, each of short duration and each involving only a few customers (service lines, single phase tap lines, etc.) may not have anywhere near the same impact upon the system. Therefore, it is extremely important to know how long each outage lasted, and approximately how many customers were affected by each outage. Multiplying the number of customers affected by the length of time of the outages gives a valuable common denominator, "customer-outage-hours", for analyzing outage impacts upon the system.

From Table 1, we can see a significant increase in outage-affected customers in 1986 over 1985, the vast majority of which related to "unplanned" outages (thus demonstrating the low impact of the PCB testing program). The six months of 1987 also show a radical increase in this category, resulting from several large outages in the system last Spring. Notice, however, the declining numbers and percentages of customers affected by tree-related outages as a proportion of unplan-

Table 1. Outage data for Murray City Power, 1985-mid 1987. Demonstrating declining of tree-related outages, attributable to improved pruning techniques.

	1985	1986	1987 (6 mo.)
Outages (interruptions)			
Total	395	681	581
Unplanned		311	151
Tree-related	41 (10%)	29 (9%)	18 (12%)
Outage-affected customers			
Total	13475	25155	24661
Unplanned	-	22433 (89%)	21773 (88%)
Tree-related	960 (7%)	459 (2%)	118 (◄1%)
Customer X outage hours			
Total	30664	21803	36524
Unplanned	-	20704 (95%)	35506 (97%)
Tree-related	1382 (4.5%)	489 (2.4%)	227 (◄1%)

ned outages.

The last row of data in Table 1 confirms the minimal impact of tree-related outages upon our customers, by summing the products of the number of customers affected by each outage and the duration of each outage.

Summary

Murray City Power has successfully incorporated its utility line clearance program into a broader context of urban forest management. By doing so, we have more satisfied customers, healthier trees, a more reliable and cost effective electrical system, and a more beautiful community. We are energized about professional arboriculture, and look forward to new innovations and technologies that will perpetuate our success.

TREATMENT OF PITCH CANKER ON MONTEREY PINE WITH FUNGISOL INJECTION

by Steven A. Tjosvold and Arthur H. McCain[1]

Abstract. Fungisol injections into mature Monterey pines with pitch canker, caused by *Fusarium subglutinans*, failed to eradicate pre-existing branch infections and did not prevent disease when trees were artificially inoculated or infected naturally.

Résumé. Des pins de Monterey (*Pinus radiata*) à maturité infectés d'un chancre causé par *Fusarium subglutinans* furent traités avec DEBC (Fungisol) par des injections de type Maujet. Le traitement n'a pas permis d'éliminer les infections présentes sur les branches et de prévenir la maladie lorsque les arbres furent inoculés artificiellement ou naturellement par le champignon.

Pitch canker, a disease of pines, was found in the summer of 1986 to affect several thousand Monterey pines throughout Santa Cruz county, California. Although Monterey pine *(Pinus radiata)* was the principal species infected, allepo pine *(Pinus halepensis)*, Bishop pine *(Pinus muricata)*, and Italian Stone pine *(Pinus pinea)* were infected as well. Several hundred infected trees were found in nearby counties.

Pitch canker is caused by the fungus *Fusarium subglutinans*. It primarily causes branch dieback and cankers on the trunks. All infected tissue is resin-soaked and stained an amber color. Often copious pitch exudes from infected tissue. Many pitch canker-infected trees are dying. Whether tree death is caused primarily by the disease or by the insects that are attracted to the unhealthy trees is under investigation.

Several control strategies have been proposed. One strategy is doing essentially nothing because it is thought that the fungus will not kill trees and infected trees will recover. Another strategy proposes removal of moderately to severely infected trees to reduce the fungus (inoculum) levels and therefore reduce disease incidence. A third strategy proposes injecting the trees with the fungicide DEBC 2-(2-ethoxyethoxy) ethyl-2-benzimidazole carbamate (Fungisol). The J.J. Mauget Co. has a registration for Fungisol in California for pine pitch canker control and apparently had efficacy data to support its registration. This paper reports the results of injecting mature Monterey pines with Fungisol.

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