

P2 Project # 01.0007.94

CASE STUDIES UTILIZING LIFE CYCLE ASSESSMENTS AS A MANAGEMENT TOOL FOR INCORPORATION INTO CURRENT LCRA EDUCATION CURRICULA

1. Solvent Selection:

The utility had been using about 2,000 gallons per year of a solvent containing 1,1,1-trichloroethane (TCA), However, they wanted to switch because of concerns regarding potential health risks and increasing costs for disposal of TCA and TCA contaminated materials.

The utility purchased the TCA for approximately \$6 per gallon and the citrus based solvent for \$10 per gallon, including transportation and delivery charges. Training employees in the proper handling and use of TCA runs about 80 man hours a year versus 20- person hours for the citrus based solvent. Employees that evaluated the citrus solvent stated that it took 10% more citrus solvent and took 10% longer to complete the cleaning.

Since TCA is a listed hazardous waste it requires more record keeping and it also requires substantially more record keeping than citrus based solvents. Further more the utility pays about \$450 per drum to dispose of the TCA and TCA contaminated materials. By comparison, citrus based solvent is not a listed hazardous waste and only costs \$175 per drum to dispose of.

Based on materials cost alone TCA is the least expensive; however, when life cycle costs are considered, the total cost for providing a years of cleaning services are similar. The lower training and disposal costs make the Citrus based solvent the lowest cost and best choice. Other externalities such as risks associated with spills of TCA have not been evaluated but would most certainly drive the cost associated with the TCA even higher.

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EVALUATION

YEARLY OPERATING COSTS		
ITEM	CITRUS BASED SOLVENT	TCA BASED SOLVENT
purchase price	\$22,000.00	\$12,000.00
Training @ \$17/hr (includes OH)	\$340.00	\$1,360.00
Disposal	\$7,000.00	\$16,363.00
TOTAL	\$29,340.00	\$29,723.00

Note: FPP currently uses CITRUS SOLVENTS. Other LCRA facilities are in the process of evaluating their solvents and other materials such as aerosols:

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2. Choosing Utility Poles:

This case study begins with the comparison of poles treated with different wood preservatives , and concludes by comparing light duty steel poles with treated wood poles.

The utility is currently purchasing about 4,000 distribution poles each year. Roughly 25% of the new poles are used to replace poles that are no longer structurally sound or poles that have broken in storms or accidents. The remaining poles are used to replace existing lines or new installations. In general the utility purchases creosote - treated poles from five suppliers, depending on availability. Recently two creosote-treating facilities ceased operations, causing price increases for creosote-treated poles and decreasing availability. As a result, the utility has considered purchasing poles treated with alternate preservatives. One attractive alternative is poles treated with chromated-copper arsenate (CCA).

Poles treated with different preservatives have different initial purchase costs, transportation costs, maintenance costs and disposal costs. To make the best management decision life cycle costs for each alternative must be considered.

The most frequently used distribution pole in utility system is a 45 foot class-4 creosote treated utility pole. The cost of the pole is about \$130. Freight cost vary with distance and increase the cost by approximately 3%, making the acquisition costs for creosote-treated poles approximately \$134.per pole. CCA-treated poles cost about \$127. Because CCA pole treating facilities are more distant, the delivered cost would increase by approximately 8%, making the total acquisition cost approximately \$138 per pole.

Based on materials cost alone creosote-treated poles are the least expensive; however, several use costs vary significantly. The creosote-treated poles are inspected once through their 20-year life, and many poles are treated to extend their lives. Typically the inspection and maintenance costs total about \$15 per pole. Because CAA treatment is a water based and the preservative is embedded into the wood, poles treated with CCA have significantly fewer decay problems. As a result a ground line maintenance and inspection program will not be needed. The life of a CCA treated pole is approximately 25 years. CCA and creosote -treated poles have virtually identical load bearing properties, so spanning capabilities are equivalent.

Disposal costs for both products are approximately the same. Both treated poles are disposed at an industrial landfill at a unit cost of \$200 per pole. Since both options are approximately equal in costs and disposal cost are a significant component of the total life cycle costs the utility explored another alternative with a significantly lower disposal cost.

In considering other alternatives the utility decided to compare steel poles with a higher spanning capability. The steel poles cost 20% more than the creosote-treated or CCA pole. Because the poles are lighter than the wood poles, transportation costs would be 75% less than that of the wood poles. The acquisition cost for a steel pole with extended spanning capability was estimated at \$170 per pole. In addition to low weight the steel poles have a significantly longer life. The poles last approximately 50 years. The installation and maintenance costs would be similar to the wood poles. Disposal costs associated with the steel poles would be less than \$75 per pole. The steel poles also may be recyclable and could possibly be sold as scrap metal. Vendors indicate that 14 steel poles could adequately do the job of 20 wood poles.

Based on known costs, steel poles seem to have significantly lower life cycle costs. Other costs associated with externalities include environmental liabilities associated with creosote and CCA treated poles. Unlike wood poles, steel poles contain no toxic materials and are unlikely to contaminate groundwater or soil or produce any negative human health effects.

EVALUATION

DISTRIBUTION POLE COSTS OVER 20 YEARS			
ITEM	Creosote Pole	CCA Pole	Steel Pole
Purchase Price	\$134/pole	\$138/pole	\$170/pole
Use	\$100/pole	\$100/pole	\$100/pole
Disposal	\$200.00	\$200.00	\$75.00
TOTAL	\$434.00	\$438.00	\$345.00

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Based on an annual purchase of 4,000 poles per year the utility would spend approximately \$1,736,000 per year on creosote poles, \$1,752,000 per year on CCA poles and \$1,380,000 on steel poles. The steel poles would save the utility more than \$356,000. These savings do not reflect additional savings from increased use and greater spanning capability. If all poles were purchased to use on a new construction and not replacement, the number of steel poles required would be 30% less and would save an additional \$430,000 or a total of \$786,000 over 20 years of the pole's life (\$39,300/yr).