

## STEEL POLE PILOT PROGRAM SETS NEW STANDARD AT ARIZONA PUBLIC SERVICE

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In 1997, the Arizona Public Service Company (APS) implemented a pilot program to evaluate alternatives to wood poles in the area it serves. Arizona Public Service's search for alternative materials got serious after an extremely damaging summer season, when strong winds wreaked havoc on the company's distribution-pole system. In less than a day, a single summer storm downed between 500 and 600 poles in the APS transmission and distribution system.

The necessary repairs were costly, both in expense and lost labor time. APS continues to seek the competitive edge by keeping costs low and assuring the delivery of reliable power, so we began to look for ways to increase the longevity and reliability of our distribution structures. More than that, we had to stop the damage caused to the system when we lost one structure. Often, one pole would go down, and it would cause a domino effect with other poles. We saw this in all seasons, with high winds in the summer, or with snow and ice in the winter. This was not acceptable.



A team was assembled to look for ways to build a better system. It included members of the APS standards department, engineering, environmental, procurement, construction crews and management — it was an inclusive company effort. The group met with different material representatives — concrete, wood, fiberglass, and steel. They reviewed alternatives, analyzed costs and safety factors, and came to the conclusion that steel stood out as the most reliable and cost-effective alternative to wood.

With this information, the Northwest Division asked APS if it could implement a pilot program with steel distribution poles to put them to a real-life test.

The Arizona Public Service Transmission and Distribution Engineering and Standards Department charged our division —the Northwest Division — with 'ironing out the bugs' so the steel distribution-pole system could be used on a division-wide scale.

We were given the go-ahead for the project with these conditions: the investigative team had to communicate openly and often with the troops, give steel an unbiased trial, and provide candid feedback on the findings.

**Adapting To Change**

One of the most critical tests was how well linemen would adjust to using a different material. The transition in Prescott went remarkably well. The crews were open-minded, and understood that we needed to make a major change.

The crews were involved in all steps of the process. With their field experience, the linemen helped make decisions and set company standards on work practices and safety protocols to follow while setting steel poles. We owe much of the success of the pilot program, and the quality system we now have in place, to them. The pilot program helped APS develop a quality procedure and enabled the company to make the transition happen.



The crews involved in the pilot program saw the advantages of using steel. We all dove in head first, and resolved issues as they arose. We've never regretted our decision to give steel a real try

As positive an experience as the Northwest Division had, companies should not underestimate the culture-change impact this transition will have on their employees. Culture change can be a major obstacle if the front line employee — the lineman — is not included in the process of creating company standards and work practices from the initiation of the project.



Following the pilot program, APS put together a special Distribution Steel Pole Committee that resolved many significant issues relating to materials, safety, transportation, tools, and design.

The committee, which was charged with addressing additional issues identified in the pilot program, consisted of representatives from the union, safety, engineering and standards and construction. The committee traveled to every construction dock in the company to communicate the changes and improvements made to the steel-pole construction process. In addition, they offered crews hands-on demonstrations of the new tools and materials recommended by the committee.

### Steel Offered Substantial Benefits

Steel distribution poles offer several advantages to APS. We found that when a steel pole is damaged, it **may not require immediate repair**. This can eliminate off-hours work, which results in costly overtime.

Steel poles can be **pre-drilled to a utility's specifications** by the manufacturer. This allows pre-planning for other services, such as cable television and telephone, to share the pole and for the addition of electrical equipment.

**Steel poles are at least 30 percent lighter** than wood poles, which makes them easier to transport and install. Using steel allows us to move more poles at a time with less stress on the equipment.

### Steel Pole Discoveries

Common misconceptions about steel poles may deter some utility companies from giving them serious consideration as an alternative to wood.

One of the most common misconceptions is that steel poles cost more than wood. APS took into consideration, not just the purchase price, but the total owning costs. The longevity of steel poles is greater than wood, which makes them cost-effective in the long run.



*The life span of a steel pole is 60 to 80 years — two times longer than that of an average wood pole.*



*Poles can be pre-drilled, which reduces labor time during installation.*

*Because steel poles are lighter than wood, they are easier to transport and carry to job sites.*



People will say that wood poles last as long, but our experience has found that typically they don't. The exception is a wood pole made of cedar. But cedar is almost impossible to come by now, and when it is available, it can cost more than steel. When evaluating the life-cycle costs of both wood and steel, APS came to the conclusion that steel is the best choice for our service territory.

Some utilities think that linemen will only work with wood. We still have a few areas resistant to the use of steel poles. This is a valid concern, and some apprehension is common among linemen. But, as we found, as long as crews strictly follow all the safety rules they should use when working with wood poles, there shouldn't be any problems with steel.



The electrical safety of linemen working steel distribution poles is another concern, but in actuality, there shouldn't be a great difference in the way you handle wood and steel. The NESC does not differentiate between the types of materials used for poles. Wood also conducts electricity, particularly when wet. All pole materials should be treated as conductive. You simply take the same safety precautions for wood and steel, and follow them to the letter. Every company needs to take a good look at their safe-working rules and ensure that there are no gaps. All safety issues must be addressed.

A steel pole distribution system built to NESC code can actually decrease the threat of damage or power outages caused by lightning. That's because each steel pole is grounded, which creates more paths for the lightning to travel on and disperse.

All steel poles at APS come from the manufacturer installed with a grounding plate. We've saved on labor and equipment because steel is directly imbedded and doesn't require a ground rod on most installations.

On lines insulated at the minimal BIL, utilities should look at increasing the insulation level, whether using wood or steel. About three years ago, our engineering department analyzed BIL requirements and determined insulation levels were adequate throughout our system. APS standardized on polymer insulators in the mid 1990's which has proven to be successful.



*If guying is required, steel poles are guyed using the same hardware currently used for wood poles. Permanent attachments, such as vangs, can be welded into the poles for attaching guys.*

Despite the initial nervousness about working with a "new" material, the crews adapted well. Not only did they follow the rules, but they — together with the standards department and steel-pole task team — established additional guidelines and safety standards for the steel installation.



Also, the linemen were allowed to adapt to steel on their own schedules — no one was forced into a set pace. It was helpful that we were able to use much of the same hardware with the steel poles as with wood, which minimized the need for special training.

*Because they are engineered in a controlled manufacturing environment, each steel pole is uniformly consistent in quality and strength.*

### Company Wide Acceptance

With these and other positive field results, steel poles are now the standard for APS on a company-wide scale. In the four years since the pilot program was initiated, steel has become the material most used in all new installations and to rebuild existing systems.



*Steel poles are used in all types of environments, from city streets to rolling hills.*

During the past year, the Northwest Division of APS installed some 700 steel distribution poles. And, from June 1999 to June 2000, the company installed almost 5,500 new steel poles throughout its distribution system. Over the same time period, only 1,462 new wood poles were installed. APS is currently installing 89% steel poles company-wide.

APS is proud of the fact that this diverse group took on a problem that impacted customers' service requiring an innovative solution. The success of the testing and introduction of steel poles at APS is due to the support and hard work of many people — from executive management to the front-line crews.

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