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BEFORE THE ARIZONA CORPORATION COMMISSION

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AZ CORP COMMISSION  
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Arizona Corporation Commission

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JUN 05 2014

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IN THE MATTER OF THE FORMAL  
COMPLAINT OF ROGER AND DARLENE  
CHANTEL,

DOCKET NO. E-01750A-09-0149

COMPLAINANTS,

NOTICE OF FILING  
INSPECTION REPORT

vs.

MOHAVE ELECTRIC COOPERATIVE, INC.

ORIGINAL

RESPONDENT.

The Utilities Division ("Staff") of the Arizona Corporation Commission ("Commission") hereby files a copy of the Inspection Report as requested by the Administrative Law Judge in her June 2, 2014 Procedural Order. Staff prepared this report following a September 18, 2013 inspection of Mohave Electric Cooperative, Inc.'s poles and line abutting Highway 66. Staff further provides notice that it will attend the August, 5, 2014 procedural conference, but notes that Mr. Stoneburg, the author of the report will not be available to attend on that date and will be unavailable until after August 8, 2014.

RESPECTFULLY SUBMITTED this 5<sup>th</sup> day of June, 2014.

Wesley C. Van Cleve  
Attorney, Legal Division  
Arizona Corporation Commission  
1200 West Washington Street  
Phoenix, Arizona 85007  
(602) 542-3402

1 **Original and thirteen (13) copies of**  
2 **the foregoing filed this 5<sup>th</sup> day of**  
3 **June**, 2014, with:

3 Docket Control  
4 Arizona Corporation Commission  
5 1200 West Washington Street  
6 Phoenix, Arizona 85007

6 **Copy of the foregoing mailed this**  
7 **5<sup>th</sup> day of June**, 2014, to:

8 Roger and Darlene Chantel  
9 10001 East Highway 66  
10 Kingman, Arizona 86401

11 Michael A. Curtis  
12 Larry K. Udall  
13 CURTIS, GOODWIN, SULLIVAN  
14 & SCHWAB, P.L.C.  
15 501 East Thomas Road  
16 Phoenix, Arizona 85012

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## Inspection Report

### Arizona Corporation Commission (“Commission”) Utilities Division Staff (“Staff”) Inspection of Mohave Electric Distribution Line between Mile Markers 66 and 80 on US Route 66 Northeast of Kingman, Arizona

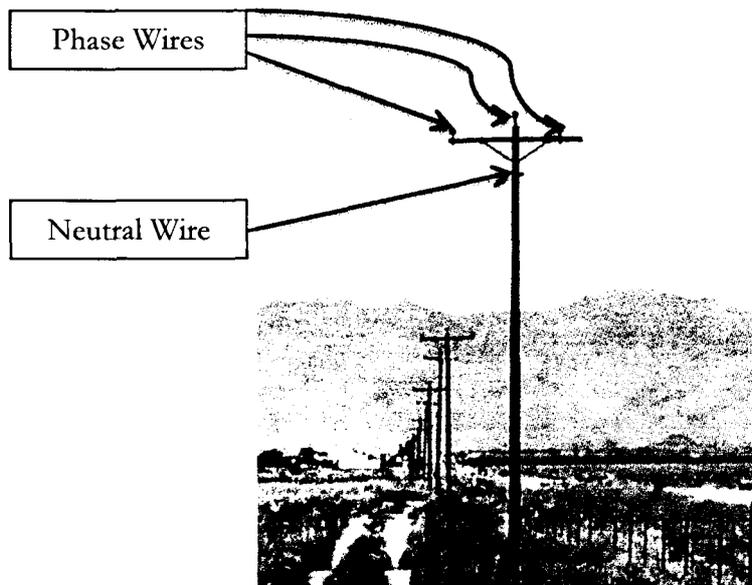
#### Introduction

As part of an ongoing dispute between Mr. & Mrs. Roger Chantel (“Chantels”) and Mohave Electric Cooperative (“MEC”) in Docket 09-0149<sup>1</sup>, Staff has assessed the design and condition of a three-phase 14.4kV/24.9kV electric distribution line owned by MEC located along US Route 66 between mile markers 66 and 80 (approximately 14 miles of line) in Mohave County northeast of Kingman, Arizona. (See Attachment A) The inspection was to include a section of the line, located on the Chantels’ property at 10001 E. Hwy. 66, Kingman, Arizona, that was bypassed and de-energized by MEC in September 2008.

#### Background on Distribution Line

The subject three-phase line serves MEC customers along its entire length, including Valle Vista subdivision and several railroad signal facilities along the railroad that parallels US Route 66. Per MEC the line was originally constructed in 1949. The configuration and design of the line, therefore, was built and is subject to the standards that were in effect at that time. The line is typical wood pole horizontal construction with the neutral attached to the pole and located beneath the phase wires as shown in Figure 1 below.

Figure 1 – Mile Marker 69 Looking Northeast



<sup>1</sup> At this time Staff is not a formal party to this Docket, however, the Chantels had included in a recent filing in this Docket a request to have Staff inspect this line, claiming it is unsafe. Based upon that request Staff elected to perform an inspection.

## MEC Line showing typical horizontal construction

The conductor is 1/0 Aluminum Conductor Steel Reinforced (“ACSR”) and there are approximately 150 poles in this fourteen mile segment of the line. The majority of the line appears to be constructed on 40 foot poles with eight foot crossarms except where taller poles are needed for clearance and junctions. Span lengths for the line range from less than 300 feet to 773 feet. The terrain is generally flat to gently rolling.

MEC does have near term plans to rebuild ten miles of this line from the Valle Vista subdivision (mile marker 70), back to the east as part of a systematic upgrade of older facilities. The rebuild will replace the existing facilities with all new facilities using narrow profile construction and increasing the conductor size to 4/0 ACSR for increased load serving capability. In locations where the line is set back from the roadway, MEC intends to build the new line nearer the roadway to provide easier access for maintenance, inspection, and repairs. Staff noted that a project to upgrade 5 miles of this line was included in the Construction Work Plan MEC provided in its rate case in Docket E-01750A-11-0136.

### **Inspection Approach**

On September 18, 2013, Staff drove the entire line twice looking for obvious defects such as broken poles, leaning poles, broken crossarms or insulators, broken insulator pins, loose conductors, and loose hardware. Staff also physically inspected a random selection of poles. Span lengths, the distance between poles, were determined using maps provided by MEC and confirmed using geographic information from Google Maps.

### **Inspection Results**

The driving inspection of the subject line found no broken poles, broken crossarms or insulators, broken insulator pins, loose conductors, or obvious loose hardware. Three poles were noted to be moderately leaning, one of those being on the de-energized portion of the line on the Chantels’ property.

In addition to the driving inspection, a physical inspection of the line was made at mile markers 69, 71, 74.5, and 80. A total of thirteen poles were inspected. The inspection results for each pole are provided in Attachment B. In summary:

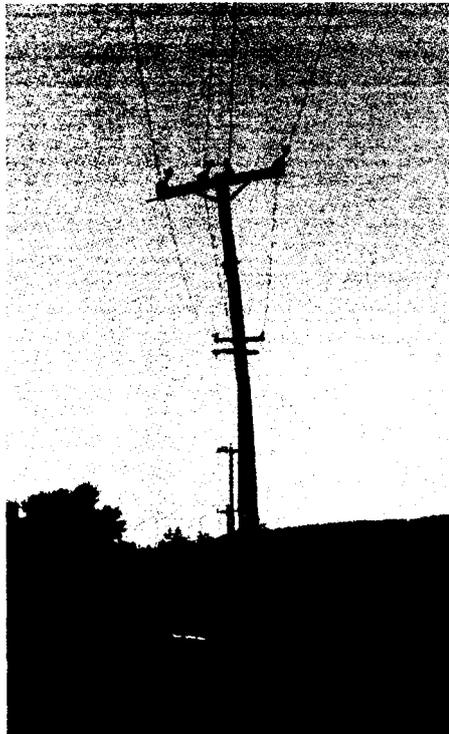
- Three of the poles were installed within the last 20 years (1993, 2002, & 2005 vintage poles) to replace deteriorated poles;
- Two of the poles had legible date tags indicating a vintage of 1947;
- Eight of the poles had illegible markings, but all appear to be the original poles likely making them 1947 vintage;
- The ten older poles all had 1998 OSMOS inspection tags indicating that the poles had been inspected. MEC has indicated that the entire line would have been inspected and

treated by OSMOS in 1998. OSMOS is a utility service company that, among other things, provides in-place pole inspections and treatment;

- Visual inspection of the poles showed no outward signs of rot or insect infestation, and all poles appeared sound. Older poles and crossarms were weathered as would be expected;
- There were no other elements found to be unsafe on the poles inspected. Ground wires were intact, hardware and crossarms were in good shape as was other equipment located on some of the poles.
- Of the thirteen poles inspected, only one was noticeably leaning.

The leaning pole that was inspected west of mile 74.5 (No. 9 in Attachment B) is shown below in Figure 2. While the pole does not appear to be an immediate risk to safety or reliability, MEC was asked about it. MEC indicated that this pole will be replaced as part of a rebuild and upgrading of this line discussed previously.

**Figure 2 – 2<sup>nd</sup> Pole West of Mile 74.5**



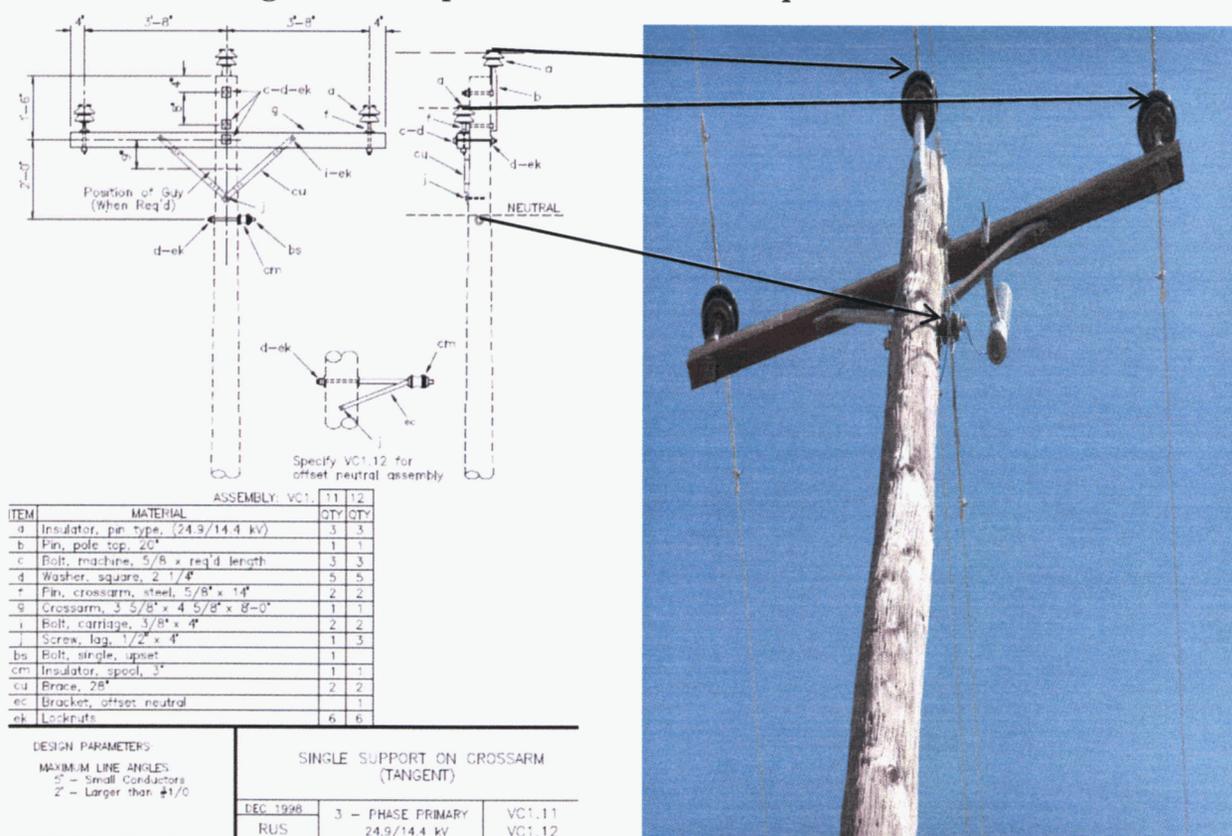
Pictures showing the condition of other poles inspected are provided in Attachment C.

MEC was also asked to provide its stated policy for line and pole inspection frequency as well as the last time this line was inspected. In response MEC indicated that it patrols all of its lines annually, and that based upon patrol logs the subject line was last inspected June 5, 2013.

## Line Design

As indicated above, the line was built in 1949, and was built to standards in existence at that time. Unless a utility is rebuilding a line, there is generally no obligation for that utility to specifically modify existing facilities for the sole purpose of reflecting new standards. That said, Staff found that the existing line is consistent with current Rural Utility Services (“RUS”) specifications<sup>2</sup> (which MEC uses) for 14.4kV/24.9kV three phase horizontal construction. RUS specifications are developed consistent with the National Electrical Safety Code (“NESC”). Figure 3 shows a comparison of the actual configuration of the MEC line with the current RUS specification. In addition, based upon approximate measurements of conductor spacing taken on the existing MEC line, the spacing of the existing line is the same as the current design configuration, which is compliant with the NESC.

**Figure 3 – Comparison of Current RUS Specification to MEC Line**



There are many factors that go into determining span lengths (pole spacing) and pole height when designing a line, but both of these are fundamentally determined by NESC clearance requirements and related sag requirements. In RUS Bulletin 1724E-154<sup>3</sup> an example is shown for a 14.4kV/24.9kV

<sup>2</sup> RUS Bulletin 1728F-803-1998 - Specifications and Drawings for 24.9/14.4 kV Line Construction

<sup>3</sup> RUS Bulletin 1724E-154 – 2003 - Distribution Conductor Clearances and Span Limitations – The clearance and span limitations in this bulletin meet or exceed NESC requirements.

line where the maximum span length for a line is 733 feet. So the maximum span length in the MEC line of 773 feet is not unrealistic.

Further supporting this conclusion is survey information provided in an August 14, 2013 filing by the Chantels' (Attachment D). The survey provides the actual pole heights, phase wire to ground and neutral wire to ground clearances on two spans of the de-energized line on the Chantels' property. The two spans are 338 feet and 679 feet in length. Table 1 below shows a comparison of actual clearance and sag information for these two spans based upon the survey information compared to current NESC and RUS standards. As can be seen from the data in Table 1, the minimum phase wire and neutral wire to ground clearances, the minimum phase wire to neutral wire clearances, and the maximum phase wire and neutral wire sags are within the NESC and RUS design standards.

**Table 1 – Comparison of Actual Clearances and Sag to Current Standards\***

		338 Foot Span (Feet)	679 Foot Span (Feet)	NESC/ RUS Standard (Feet)	Source of Standard
1	Phase Wires to Ground (From Survey)	25.9	21.8	18.5	<b>Minimum</b> Per NESC Table 232-1
2	Neutral Wire to Ground (From Survey)	24.6	19.9	18.5	<b>Minimum</b> Per NESC Table 232-1
3	Phase Wires to Neutral Vertical Clearance (Calculated)	1.30	1.90	1.25	<b>Minimum</b> Per RUS Bulletin 1724E-154
4	Average Height of Phase Conductors at Pole (Calculated)	31.0	33.0	-	N/A
5	Average Height of Neutral Conductor at Pole (Calculated)	26.8	26.9	-	N/A
6	Phase Conductor Sag (Calculated)	5.1	11.2	19.7	<b>Maximum</b> per RUS Bulletin 1724E-154
7	Neutral Conductor Sag (Calculated)	2.2	7.0	19.7	<b>Maximum</b> per RUS Bulletin 1724E-154

\*The actual clearances and sag are dependent upon air temperature and conductor loading

The strength of the poles used when building a line are determined by the loading that will be placed upon the pole, including conductor tension, angle of conductor, and heavy equipment such as transformers, etc. Poles are categorized into Classes based upon the diameter of the pole as measured six feet from the butt of the pole. The diameter of the pole required for the pole to fall into a certain Class is dependent upon the height of the pole.

Poles inspected in the subject line that still had legible markings ranged from Class 2 to Class 5. (The smaller the class number the stronger the pole, with Class 1 being the strongest and Class 5 the weakest.) An engineering evaluation of the appropriateness of the Class of the poles in the subject line

was beyond the scope of this inspection, but the Classes of the poles used are typical of those used in constructing a distribution line of this type and voltage.

While Staff performance of a rigorous detailed engineering analysis of the entire MEC line was beyond the scope of this inspection, it is Staff's opinion based upon this review that the span lengths and conductor clearances of the MEC line do not violate any RUS or NESC standards. In addition, the Classes of the poles used in the line are appropriate.

### **De-Energized MEC Line on Chantels' Property**

As indicated above, the inspection on September 18, 2013 was to include the section of the line that has been de-energized and bypassed located on the Chantels' property located at 10001 E. Hwy. 66, Kingman, Arizona. While prior arrangements had been made to meet with Mr. Chantel, when Staff attempted to contact him via phone and by honking from the road in front of his property, contact could not be made. As a result, a physical inspection of this portion of the line could not be made, including an inspection of the leaning pole on the property.

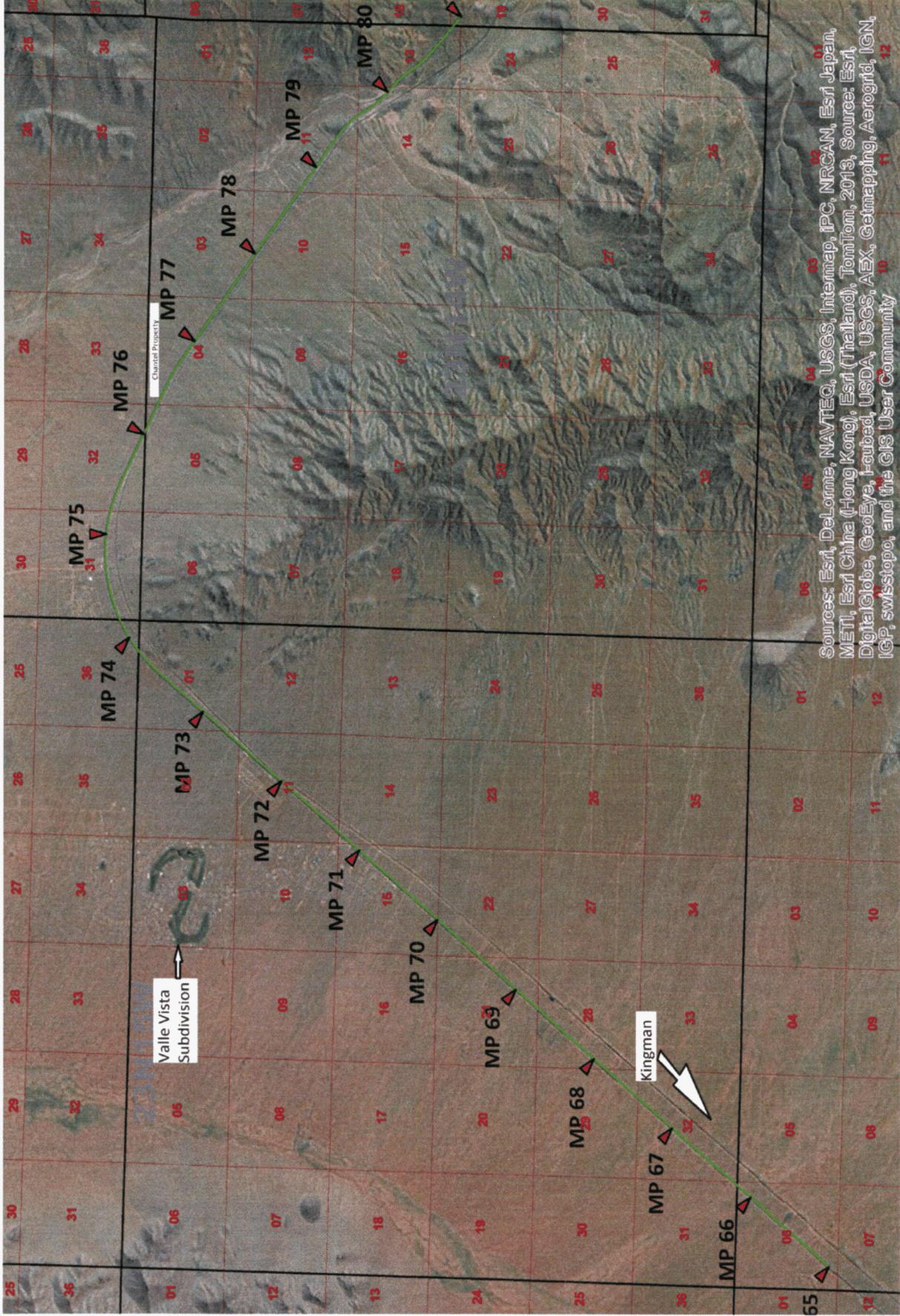
### **Conclusions**

Based upon the physical inspection of the MEC distribution line between mile markers 66 and 80 on US Route 66 in Mohave County northeast of Kingman, Arizona on September 18, 2013 and subsequent analysis as discussed in this Memorandum, Staff concludes that:

1. The line has been appropriately maintained by MEC and there is no indication the condition of the line poses an immediate safety or reliability risk. Poles have been inspected and treated using industry standard practices. Deteriorated poles have been replaced, as evidenced by the three new poles identified out of the thirteen randomly inspected;
2. Only three poles out of the approximately 150 were noted as moderately leaning. Two of those do not appear to pose an immediate safety or reliability risk. The third on the de-energized portion of the line located on the Chantels' property could not be assessed.
3. The design of the line is typical horizontal construction. Based upon the evaluation of two specific spans, and visual inspection of the remainder of the line, the design appears to meet RUS and NECS standards for span lengths, clearances, and sag. Further, the Classes of the poles used in the subject line are typical of those used in constructing a distribution line of this type and voltage.
4. MEC's approach to systematically replace older facilities like the subject line is consistent with good utility practice.

Edward Stoneburg  
Electric Utility Engineer

Location of MEC 14.4kV/24.9/kV Distribution Line Along US Route 66 Northeast of Kingman



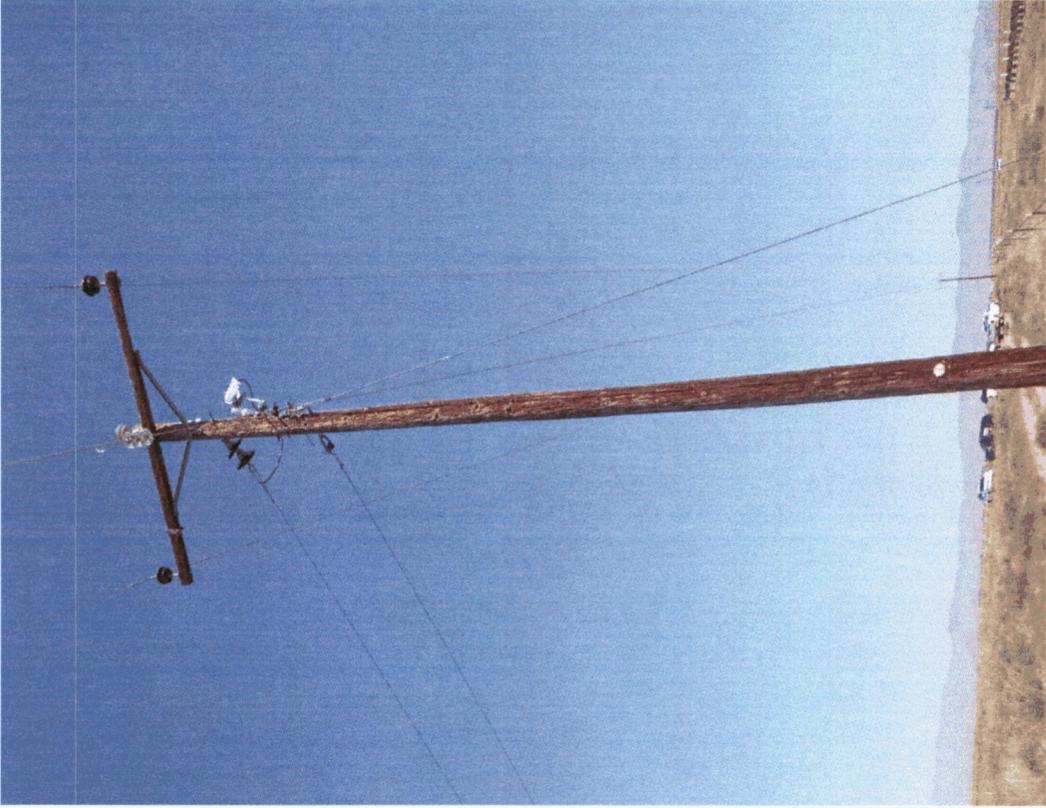
Mohave Electric Cooperative Distribution Line Inspection  
Individual Pole Inspection Results

#	Location	Vintage of Pole	Size of Pole (ft)	Evidence of Deterioration	Leaning	Other unsafe elements	Type of Wood <sup>1</sup>	OSMOS Inspection	Comments
1	Mile Marker 69 – 1 <sup>st</sup> W of	1947	40	No	No	No	DF	1998	
2	Mile Marker 69 – 2 <sup>nd</sup> W of	1947	40	No	No	No	DF	1998	
3	Mile Marker 69 – 1 <sup>st</sup> E of	2005	40	No	No	No	DF	-	
4	Mile Marker 69 – 2 <sup>nd</sup> E of	N/A	40	No	No	No	DF	1998	Likely 1947 Vintage, DF
5	Mile Marker 71 – 2 <sup>nd</sup> E of	N/A	40	No	No	No	N/A	1998	Likely 1947 Vintage, DF
6	Mile Marker 71 – 3 <sup>rd</sup> E of	2002	45	No	No	No	DF	-	
7	Mile Marker 71 – 4 <sup>th</sup> E of	N/A	45	No	No	No	N/A	1998	Likely 1947 Vintage, DF
8	Mile Marker 74.5 – 1 <sup>st</sup> W of	N/A	40	No	No	No	N/A	1998	Likely 1947 Vintage, DF
9	Mile Marker 74.5 – 2 <sup>nd</sup> W of (Line Switch Pole)	N/A	45	No	Yes	No	N/A	N/A	Likely 1947 Vintage, DF
10	Mile Marker 74.5 – At Intersection	N/A	45	No	No	No	N/A	1998	Likely 1947 Vintage, DF
11	Mile Marker 74.5 – 1 <sup>st</sup> E of	1993	40	No	No	No	DF	-	
12	Mile Marker 80 – 1 <sup>st</sup> E of	N/A	40	No	No	No	N/A	1998	Likely 1947 Vintage, DF
13	Mile Marker 80 – 2 <sup>nd</sup> E of	N/A	40	No	No	No	N/A	1998	Likely 1947 Vintage, DF

<sup>1</sup>DF – Douglas Fir

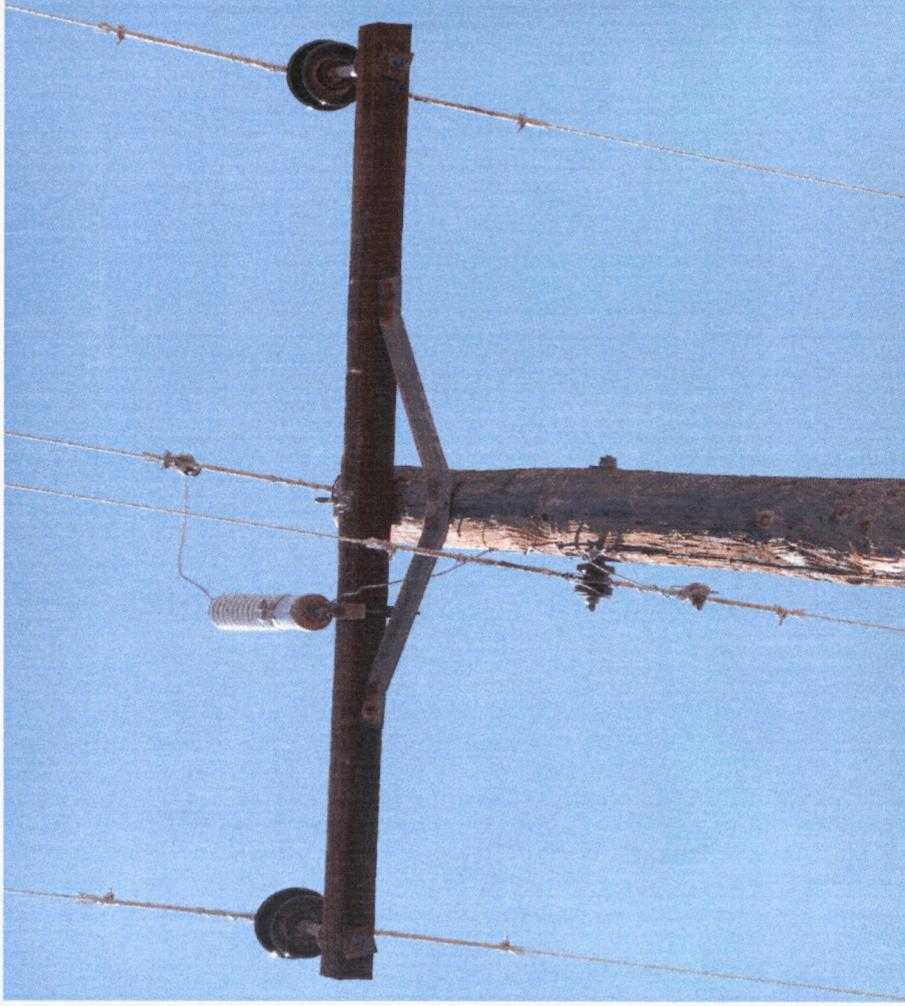
Mohave Electric Cooperative Distribution Line Inspection  
Photos

1 - Mile Marker 69 1<sup>st</sup> Pole West of - 1947 Vintage Pole



Mohave Electric Cooperative Distribution Line Inspection  
Photos

2 - Mile Marker 69 2<sup>nd</sup> Pole West of - 1947 Vintage Pole, OSMOS Inspection Tag 1998



Mohave Electric Cooperative Distribution Line Inspection  
Photos

3 - Mile Marker 69 1<sup>st</sup> Pole East of - New Pole 2005 Vintage

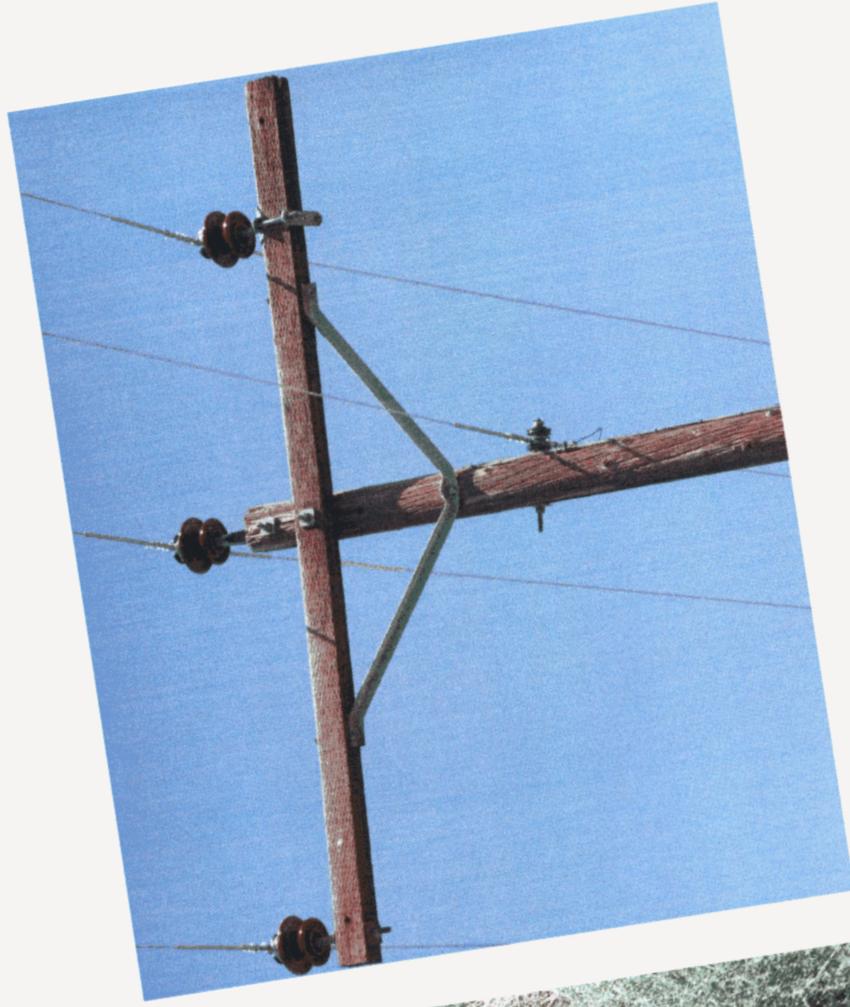


Mohave Electric Cooperative Distribution Line Inspection  
Photos

4 - Mile Marker 69 2<sup>nd</sup> Pole East of - Likely 1947 Vintage - Note Insulator Bracket on Right Side of Crossarm Used to Repair Split



4 - Mile Marker 69 2<sup>nd</sup> Pole East of - Likely 1947 Vintage - Note Insulator Bracket on Right Side of Crossarm Used to Repair Split



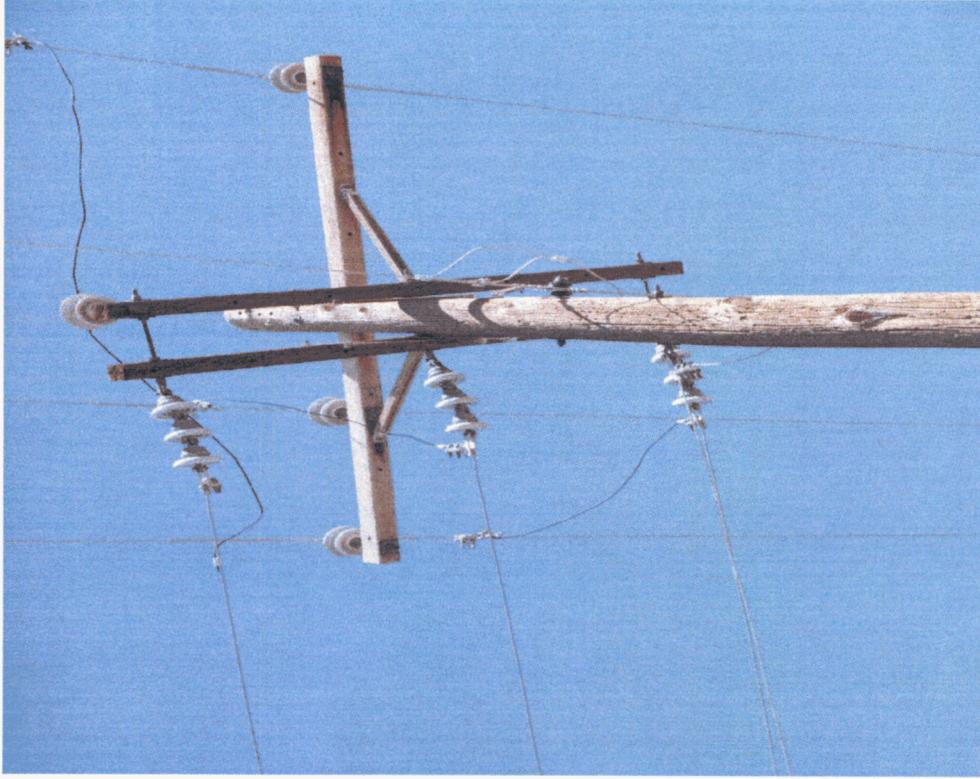
Mohave Electric Cooperative Distribution Line Inspection  
Photos

5 - Mile Marker 71 2<sup>nd</sup> Pole East of - Likely 1947 Vintage - Note Wood Plug in Picture on Right Either from a Boring when Originally Produced or from a Prior Bore Inspection



Mohave Electric Cooperative Distribution Line Inspection  
Photos

6 - Mile Marker 71 3<sup>rd</sup> Pole East of – New Pole 202 Vintage



Mohave Electric Cooperative Distribution Line Inspection  
Photos

7 - Mile Marker 71 4<sup>th</sup> Pole East of - Likely 1947 Vintage, 1998 OSMOS Inspection Tag



Mohave Electric Cooperative Distribution Line Inspection  
Photos

8 - Mile Marker 74.5 1<sup>st</sup> Pole West of - Likely Vintage 1947, 1998 OSMOS Inspection Tag



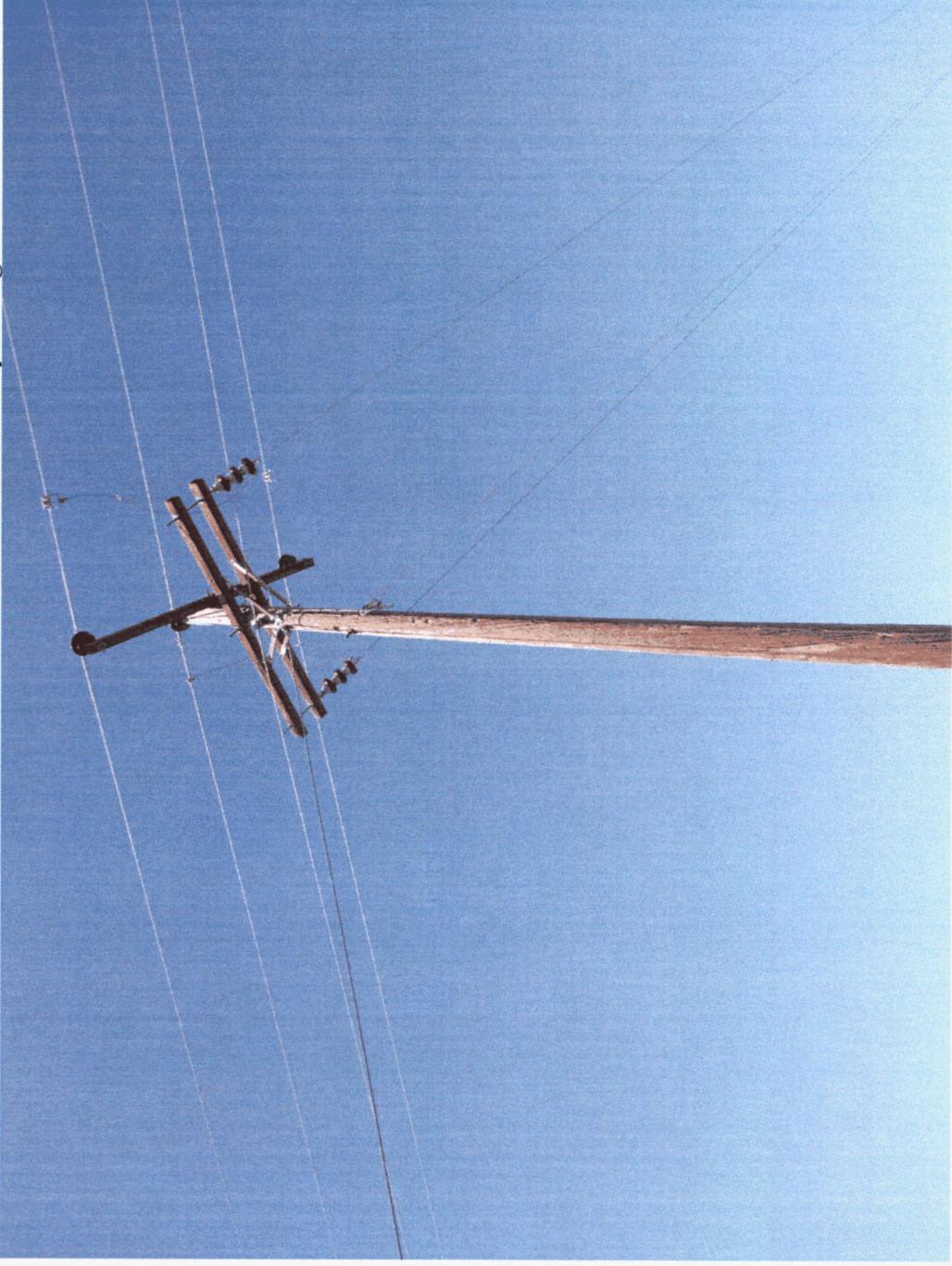
Mohave Electric Cooperative Distribution Line Inspection  
Photos

9 - Mile Marker 74.5 2<sup>nd</sup> Pole West of - Likely Vintage 1947, Sectionalizing Line Switch Pole, Pole is Leaning



Mohave Electric Cooperative Distribution Line Inspection  
Photos

10 - Mile Marker 74.5 Pole at Intersection of US 66 & Boulder Rd- Likely Vintage 1947



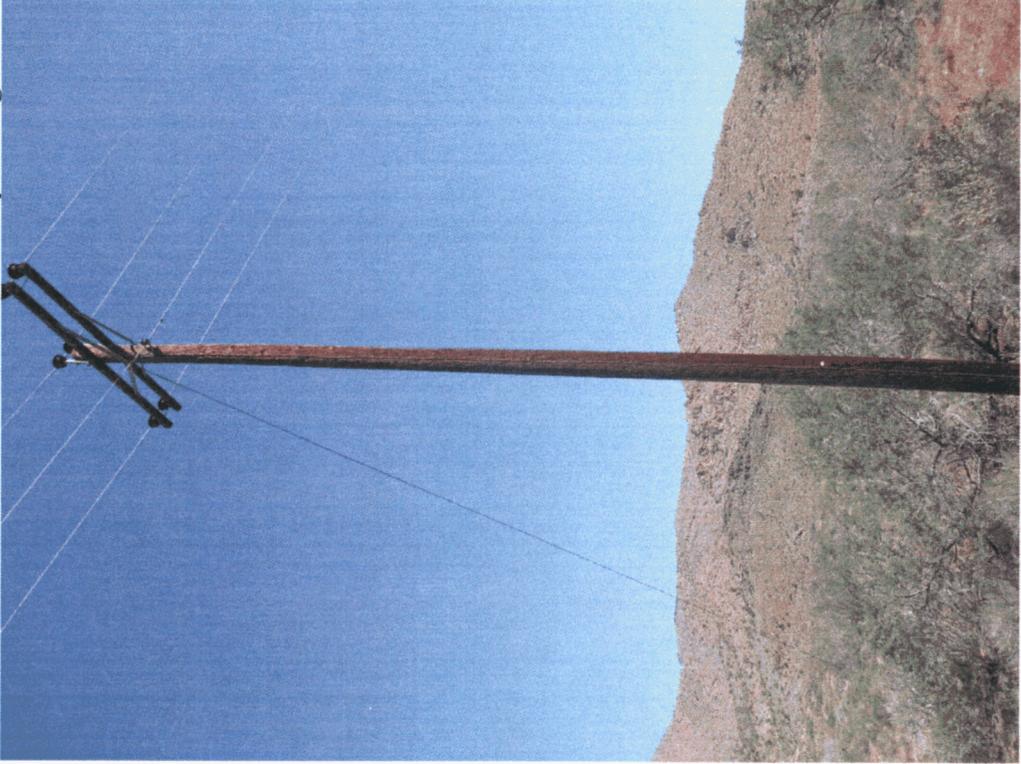
Mohave Electric Cooperative Distribution Line Inspection  
Photos

11- Mile Marker 74.5 1<sup>st</sup> Pole East of – 1993 Vintage



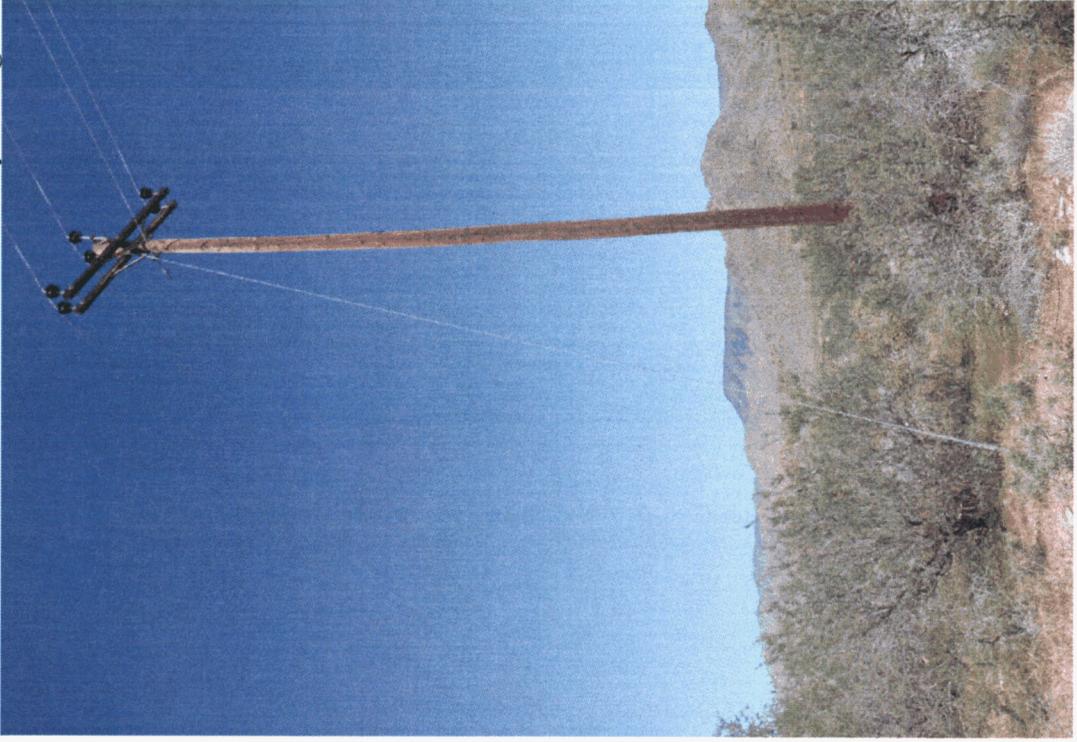
Mohave Electric Cooperative Distribution Line Inspection  
Photos

12 - Mile Marker 80 1<sup>st</sup> Pole East of - Likely Vintage 1947



Mohave Electric Cooperative Distribution Line Inspection  
Photos

13 - Mile Marker 80 2<sup>nd</sup> Pole East of - Likely Vintage 1947, Guyed Angle Pole



Mohave Electric Cooperative Distribution Line Inspection  
Photos

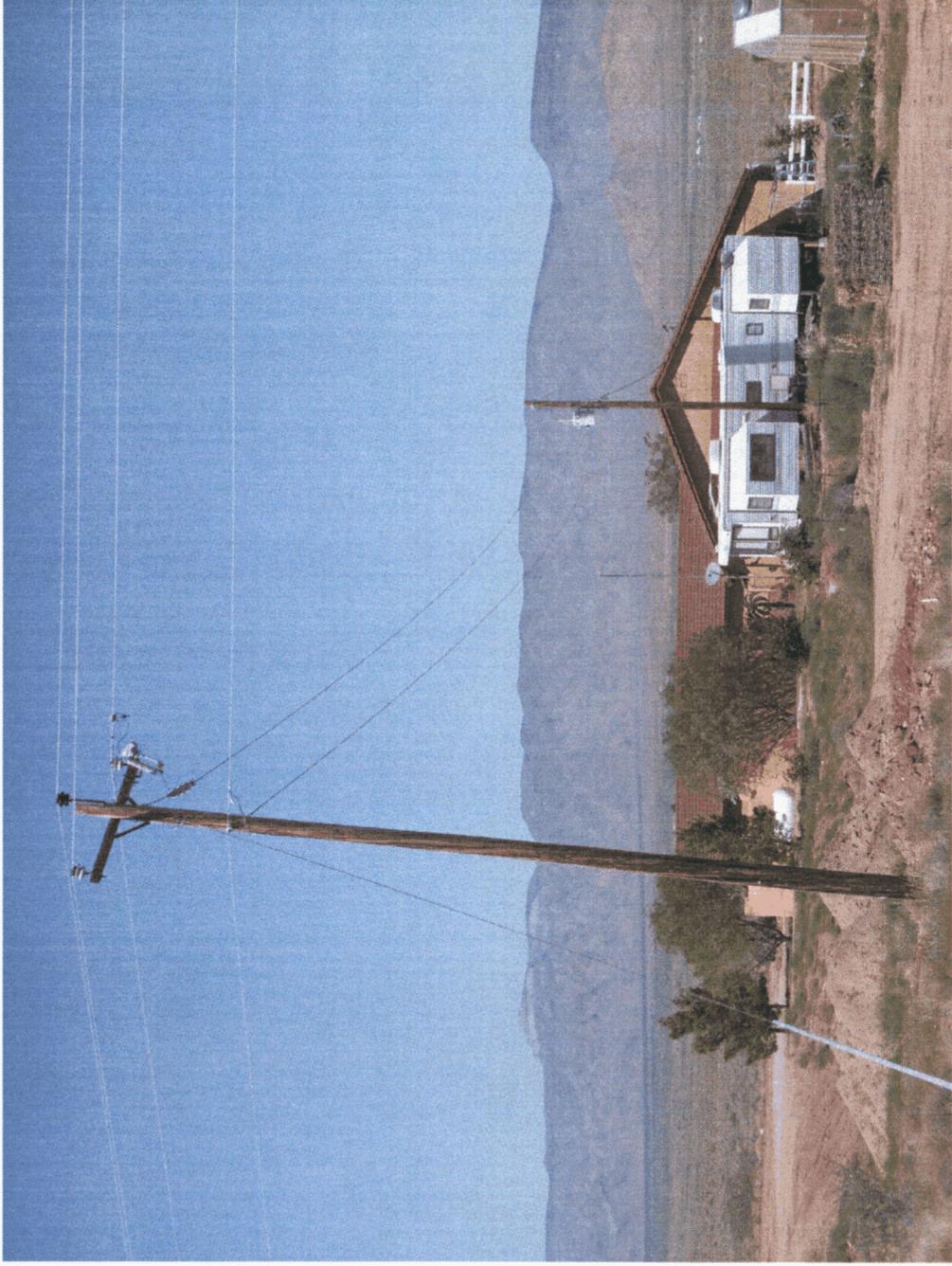
De-energized Line on Chantel Property

New Energized Line



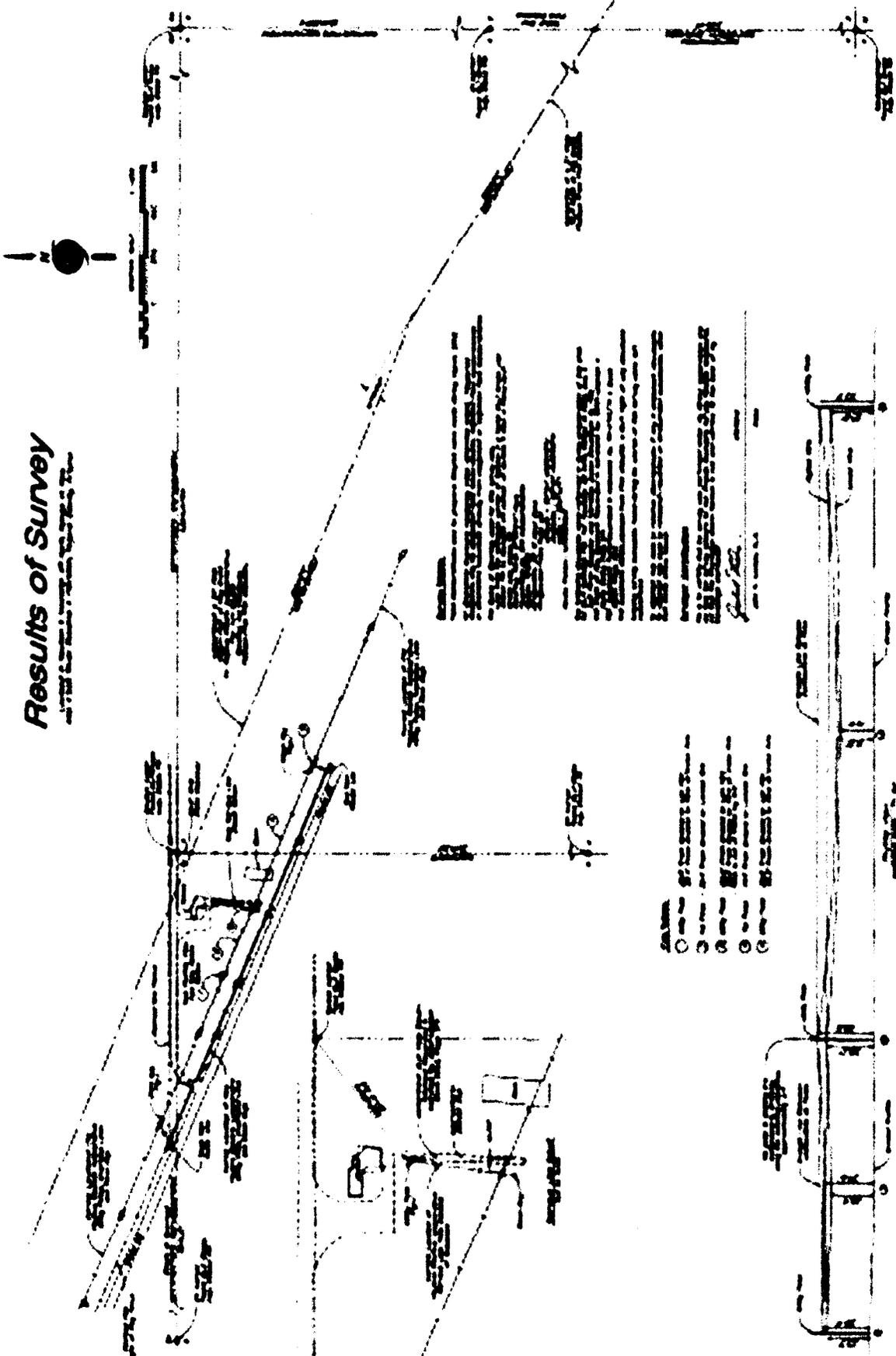
Mohave Electric Cooperative Distribution Line Inspection  
Photos

De-energized Line on Chantel Property



# Results of Survey

APR 11 2013



- 1/4 SECTION 36, T.1N, R.1E
- 1/4 SECTION 37, T.1N, R.1E
- 1/4 SECTION 38, T.1N, R.1E
- 1/4 SECTION 39, T.1N, R.1E
- 1/4 SECTION 40, T.1N, R.1E

SECTION 36, T.1N, R.1E  
 SECTION 37, T.1N, R.1E  
 SECTION 38, T.1N, R.1E  
 SECTION 39, T.1N, R.1E  
 SECTION 40, T.1N, R.1E

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ROGER OWEN

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